

[Frontispiece.]
BOW OF "KNIGHT BACHELOR" AFTER STRIKING A GROWLER.
(See page 6, Introduction.)

EX

REPORT
OF THE
EXPEDITION TO HUDSON BAY
AND CUMBERLAND GULF

IN THE
STEAMSHIP "DIANA"

UNDER THE COMMAND OF
WILLIAM WAKEHAM
MARINE AND FISHERIES CANADA
IN THE YEAR 1897

PRINTED BY ORDER OF PARLIAMENT



OTTAWA
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HUDSON BAY EXPEDITION, 1897.

REPORT.

OTTAWA, December, 1897.

The Honourable

Sir LOUIS H. DAVIES, K.C.M.G.,
Minister of Marine and Fisheries,
Canada.

SIR,—As the officer in command of the expedition to Hudson Bay and Strait I beg to submit the following report.

I propose to submit this report under the following heads:—

- 1st. The journal of daily events.
- 2nd. A detailed account of the more important events of the voyage and my observations on the ice met with.
- 3rd. A short account of some of the previous voyages into the bay, and statements of the views of whaling captains and others, together with my own conclusions on the subject of the navigation of the strait.
- 4th. The fishing capabilities of the region, and extent to which aliens carry on fishing or whaling within our territorial limits.

In accordance with the instructions contained in your letter of the 23rd of April last, I proceeded to Halifax to take command of the SS. "Diana," which vessel had been chartered for the purpose of the expedition, and, before proceeding directly with the report as above, it may be well for me to explain fully how this ship came to be selected for the voyage to Hudson Bay.

When it was decided to inquire anew into the question of the season during which Hudson Strait could fairly be considered navigable for commercial purposes, and to test the matter by sending out a ship which should proceed to the north, and if possible penetrate the strait at a much earlier date than had been contemplated on the former expeditions, it was at once suggested that the department's ship "Stanley" should be employed for this service.

This vessel had been built for winter service in the Strait of Northumberland. She was of great strength and power and had ample accommodation, and to many she appeared to be in every way suited for the work. The question of her fitness having, however, been submitted to Captain Finlayson, who had sailed her since her arrival in this country, and to her chief engineer, as well as to myself, we were all of the opinion that she was not a fit and proper ship for the proposed service, for the following among other reasons:—

Firstly: The "Stanley" was built for a special service, where she had to meet with comparatively light ice. She draws but little at the bow, so that she can run up on the ice and crush through it by her weight. She is fitted with tanks and pumping gear for so trimming her, that she may if she rises on ice too heavy for her to break through,

either add to her weight forward and crush it down, or by deepening her aft, slide back off it. All this may be done in light field ice, but with such ice as is met with in Hudson Strait this sort of manœuvring would be useless and impossible.

Secondly: The "Stanley," strong as she undoubtedly is, would not be able to stand any heavy ice pressure. It is well known that the simple tumble home of the light ice with which she has to contend has already dinged her between the frames, and we have been obliged to double her. A vessel to be able to stand a nip must be almost solid in the walls, and there must be no considerable space between the timbers.

Thirdly: In light ice such as the "Stanley" has to contend with, her screw, which is of great diameter and fixed, is safe, but in heavy ice, with her fine run, it would always be in danger and would certainly be carried away. Should she lose her screw she would be absolutely helpless, as the little canvas she carries on her pole-masts would be of no use whatever. Vessels fitted for ice have either removable screws or screws of small diameter. The rudder of the "Stanley" is not removable afloat and could not be replaced by a spare one in the event of accident. Ships fitted for extended ice navigation carry spare rudders which can be shipped afloat, are well supplied with canvas, and could if necessary be wholly managed under sail.

Fourthly: Being built for a short ferry service, the "Stanley's" consumption of coal is altogether out of proportion with her coal carrying capacity; she has no room for coal for an extended voyage and could not venture more than a couple of weeks from her coal base.

The cost of coal delivered at the entrance to the Hudson Strait for the season would amount to more than the charter of a suitable vessel.

Fifthly: Experience with the "Stanley" has shown that she makes her best work when quite light, that is, as light as she can be kept; for owing to her heavy hull and tanks and the great weight of her machinery she always draws a good deal of water. With provision and coal for a long voyage, for which work she was not fitted and constructed, she would be unduly deep, show but little freeboard and offer to the ice a wall side which it was never intended to subject to lateral ice pressure. In such a trim she would not be safe in the ice of the Strait of Northumberland to say nothing of the heavy field or rafted ice which one must expect to meet in Hudson Strait.

Other reasons could be given why the "Stanley" is not a suitable vessel for an expedition, or experimental voyage, such as it was proposed we should make and I therefore, strongly urged the department not to think of employing her.

Our experience of the ice in Hudson Strait in June and the early days of July was such that I am fully convinced I was right in the advice I gave.

On many occasions we were subject to pressure such as the "Stanley," good ship as she is, could not have withstood for an instant, and what the "Stanley" can not stand in ice it would be madness to think of putting the ordinary iron or steel ship of commerce into. Had I been only making a voyage into Hudson Bay between July and October, I would have had no objection to offer to the "Stanley" beyond the one of cost; she would answer for this sort of a trip better than any other ship I know of. This however was not what I had to do.

Given the known climatic and ice condition in Hudson Strait in June and the results of the experience of those who have navigated the strait from the days of Hudson down, I had to see that the expedition was provided with a ship properly constructed for ice navigation. This being the case, I advised that we charter a vessel such as is ordinarily used in the seal or whale fishery. That I was correct in giving this advice, is proved by the fact that, about a month after I had done so, a copy of a letter from Admiral Markham was received by your department advising the charter of either the "Terra-Nova" or "Esquimaux,"—Dundee steam whalers of exactly the same type as the vessel I had suggested.

Admiral Markham, in his letter recommending either of these vessels, says:—"Both would be admirably adapted for the purpose we would require, viz., to report on the state and condition of the ice in the strait during the summer months. If the Canadian Government have voted \$35,000 for the survey of Hudson Strait I do not see why they should not charter one or the other of these ships. They possess a speed of about eight knots and are specially constructed for ice navigation."

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The above statement, from one so admirably fitted to judge, should set at rest the question of the class of vessel required for testing the navigability of Hudson Strait during the early and late parts of the season.

It should be borne in mind that Admiral Markham, besides being one of the most distinguished of Arctic navigators, made a voyage through Hudson Strait on board the "Alert" in July, 1886, and, being a director of the proposed Hudson Bay and Pacific Railway Company, was personally interested in seeing that the most suitable class of vessel was employed for the service.

Before the receipt of Admiral Markham's letter arrangements had, however, been made for the charter of a vessel in St. John's, Newfoundland. As a result of these the "Diana" was secured.

The following table will show the relative tonnage and horse power of the vessels named :—

| Name. | How built. | Where built. | When built. | Tons net. | Tons gross. | Horse power. | |
|-----------------|------------|--------------|-------------|-----------|-------------|--------------|--------|
| Terra Nova..... | Wood | Dundee..... | 1884 | 450 | 744 | 120 | Screw. |
| Esquimaux..... | " | " | 1865 | 466 | 593 | 70 | " |
| Diana | " | " | 1870 | 275 | 473 | 70 | " |

It should here be remarked that the "Diana" though originally built in 1870 was rebuilt in 1892. She was sent home to her original builders; thoroughly opened out and made practically a new ship of. She enjoys the reputation of being one of the handiest and fastest of the Dundee ships.

Among other vessels suggested to your department was the "Port Pirie." This ship figures in the Mercantile Navy List as belonging to the Anglo-Australasian Steam Navigation Company, of London. She was built of steel at Hepburn in 1886, is of 1,829 net tons, 3,020 gross tons, of 350 horse power, screw.

The "Port Pirie" being an ordinary steel steamer which her owners admitted would have to be specially fortified for the work if accepted, it was decided that, however well suited she might be for a trip to Hudson Bay in August or September, she was not a safe ship to put into the heavy ice which we might certainly expect to meet in June or July.

I have thought it right to deal fully with the question of the ship selected for the service as it has been asserted that "to demonstrate the ease with which Hudson Strait can be navigated it was necessary to employ a vessel something similar to what might be expected to carry on the trade if the route came into use."

Now, as I understand the position, there is no question of the navigability of the strait with suitable vessels during a certain season. This was settled in 1886 when Captain Gordon made his final report on the subject. He stated, page 90 report for 1886 :—"Having now made voyages in three years to the Hudson Strait, and having carefully examined the reports of the observers, etc., I have the honour to submit the following statement in regard to the navigation of these waters."

He describes the class of ships he considers best suited for the practical commerce of the route, and concludes by saying :—"I consider that the season for the opening of navigation to such vessels as the above will, on the average, fall between the 1st and 10th of July. The closing of the season would be about the first week in October."

Therefore, I was not sent up to decide whether Hudson Strait could be navigated with suitable vessels within the dates mentioned—that question was settled, but what was required to meet the claims of those not satisfied with the dates above given, was a further test over a longer season, both spring and fall.

My instructions were to be off the mouth of the strait at the earliest possible moment when an entrance could be effected. I was, then, to press the steamer through

the strait, to ascertain its navigability, and, having reached the bay, to return to the Atlantic and make several trips in and out, and, after having settled the question as far as it could be settled in the spring and when all doubt as to the navigability was passed, I was to leave the strait and proceed on other work; resuming the navigation of the strait in the autumn of the year with a view of determining how late it is navigable, and for this purpose to repeat the operation of cruising, in and out, as I did in the spring.

By these instructions it is admitted that there is a season when there is no doubt of the navigability of the strait and, during this season, when presumably they are navigable for commercial purposes, I was not instructed to remain there.

Therefore for the work we had to do—that of pressing through the strait and into the bay at the earliest possible moment and remaining in the fall beyond the date which my predecessor had suggested for the close of navigation—I certainly required a suitably constructed ship and, given the conditions we met with, we could have had no more fit or suitable vessel than the “Diana,” and such a ship as the “Port Pirie” would never have survived the test.

The officers and men of the “Diana” were selected with special care and a due regard to the nature of the navigation required. The navigating officer, Capt. Whitley, had an extended experience; he was specially recommended by Messrs. Job Brothers, of St. John's, Newfoundland, owners of the “Diana” and other vessels of the same type. He had served under, and was recommended by, Capt. Samuel Blandford, one of the best known and most successful ice captains in Newfoundland. Captain Blandford had himself made several voyages to Hudson Strait and was the first to discover the great cod fishing resources in the neighbourhood of Cape Chudleigh and Button Islands.

Captain James Joy, of St. John's, was selected as first officer. He also had handled ships in the ice and had served as ice master on several of the Dundee vessels. Capt. Joy had the additional recommendation that he had made several fishing voyages to the mouth of Hudson Strait in the SS. “Nimrod” and was already conversant with the currents and the movements of the ice in Ungava Bay and round the mouth of the strait.

Even the petty officers and men had, nearly all of them, been engaged either on whalers, Arctic relief vessels, or on the former expeditions to the Hudson Bay and Strait made under Captain Gordon; so that every possible precaution was taken both in the choice of the vessel and in the selection of the officers and crew to man her.

We had hoped to have had the “Diana” at Halifax in time to have left by the 20th of May; but, owing to her delay in the ice at the sealing, she only reached Halifax on the 16th of May, and we were engaged until the 3rd of June in taking in supplies, coaling and fitting up the saloon and staterooms in the 'tween decks forward, for our passengers.

We had on board, when we left Halifax, on the ship's books:—

- 1 the officer in command.
- 1 sailing master.
- 2 mates.
- 3 boatswain, carpenter and coxswain.
- 12 able seamen.
- 2 engineers.
- 5 oilers and stokers.
- 1 secretary and photographer.
- 1 surgeon.
- 1 chief steward.
- 2 cooks.
- 2 assistant stewards.
- 3 members of the Geological Survey,
- 6 men in employ of do
- 1 representative for Manitoba and the North-west Territories, or 43 persons in all on board at the date of sailing.

Up to the last moment we had expected that Captain Edmund Burke, R.N., would have accompanied the expedition, and suitable accommodation had been provided

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for him. One of the gentlemen of the Geological Survey was not accompanied by the usual assistant, so that the number for which I had provided accommodation was reduced by two.

The ship was provisioned for a crew of fifty, for a voyage of seventeen months.

List of some of the terms used in ice navigation by whalers, sealers and others.

- Floe A large mass of floating ice.
 Pan A small floe or small piece; one that can be forced aside or slewed.
 A field A large body of ice that may be seen around.
 Land floe Ice frozen fast to the shore.
 Packed ice Are small pieces closed together and held by the pressure of ice and currents.
 Ice blink Is a peculiar pale yellow reflection on the sky; indicating the presence of ice at a distance.
 The ice pack Is that large body of solid ice extending across the whole sea and beyond which it is impossible to advance.
 Slack ice Is detached, so that it can be worked through. Ice is said to be slacking when it begins to be open so as to be navigable.
 Running abroad Ice is said to be running abroad when it opens out or slacks away so as to be navigable.
 A nip Ice is said to be nipping when it begins to close by reason of the action of winds or currents, so as to prevent the passage of a vessel.
 Calving Ice is calving when the small pieces break off from the bottom and rise to the surface of the water.
 A lead Is a strip of navigable water opening into the pack.
 A blind lead, a pocket Is a short opening into the pack and terminating against solid or thick ice.
 Hummocky ice Is rough, uneven or thick ice.
 Porridge ice Is small, finely ground up ice.
 Slob Is snow afloat and forming into ice.
 Sish Is thin young new ice, just formed in thin sheets.
 Lolly Is loose new ice.
 Waking Is the following in the wake of another vessel through leads and slack ice.
 Backing, ramming or butting Is backing off and running the ship at ice in order to force or head a way through it.
 Slewing Is forcing the vessel ahead against the corner of a piece of ice, with the intention of causing it to slew or swing out of the way, so as to force a passage by it.
 Tracking Is following along the edge of the ice pack.
 Water sky Is a dark or bluish appearance of the sky indicating open water beyond the pack.
 Slatches Are considerable pools of open water in the ice.
 Swatch Is a small pool of open water in the ice.
 Swatching Watching for seals round a swatch.
 Wash Is the sound of the sea breaking against ice.
 Rote Newfoundland term for wash.
 Rafting Occurs when two pans meet with force either by the action of the winds or currents—the edges are broken off and either rise on top of or pass under the body of the pans.
 Pressure ridge Is the ridge or nall thrown up while the ice has rafted.

- Growler Is a more or less washed and rounded lump of ice which rolls about in the water, formed from broken up bergs or detached pieces of heavy old Arctic floe ice.
- Decker..... Rafter at a pressure ridge (Newfoundland).
- Black sheet..... Is thin dark looking ice with no snow on it; usually found between pans of older ice. At night or at a distance looks like open water.
- Collar ice..... Is the margin of ice froze fast to an island or shore, presenting an abrupt wall against which the floating ice rises and falls with the tide.

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PART I.

DAILY JOURNAL OF THE EXPEDITION.

Thursday, 3rd June, 1897.—The members of the expedition being on board, together with the necessary stores, we left Halifax at 1 p. m. Weather fine and clear; rounded the inner automatic buoy at 3 p. m., and stood up for Scatari. Wind southerly with rain and haze. Stood a little further off the land as the night came on.

Friday, 4th June.—Night dark with heavy showers. At 4 a. m., hauled in to make the land of Cape Breton; 8 a. m., morning fine and clear, with a haze over the land. Noon—came on strong breeze from the north-east, which freshened during the afternoon and somewhat stopped our headway. Rounded Scatari at 5.30 p. m., and shaped our course midway between Cape Ray and St. Paul's.

Saturday, 5th June.—At daylight saw both lands; stood up for Cape Anguille. Fine, calm and smooth in the morning. Weather warm during the day; towards sunset, wind freshened from the north-east and got colder. Abreast of Bay of Islands at 8.30 p. m.

Sunday, 6th June.—Fine, clear weather. Point Rich abeam about ten miles off at 10 a. m. Headed down for the centre of the strait. Passed Greenly Island at 3.30 p. m., and stood on down. Met a little open ice to the west of Point Amour; this ice increased as we stood to the eastward. Worked the ship through it at full speed until after sunset, about 9 p. m., when slowed down and went ahead easy. Off Cape Norman light at 10 p. m. Ice open but getting heavier; a few growlers here and there among the field ice. Barometer 30.2 and falling. At 10.30 p. m. we stopped the ship in the ice for the night.

Monday, 7th June.—Under way at daylight. 2.30 a. m. worked ship out of the ice to the northward into comparatively clear water. Strong north-east, very cold. At 7.15 a. m., passed close off Table Island and stood along shore; light open ice and a few small bergs. Off Battle Harbour at 8 a. m. A boat came out to us, stopped the ship, and the occupant came on board. All well here; this is the first ship that has passed. The spring had been early and for some time westerly winds had prevailed and the ice had been seen. The people report a hard winter further north. They tell us we will not likely meet much ice. Continued at 8.30 a. m. Soon met more ice which is being set on shore by the strong north-east breeze now blowing. Working through more or less open ice all day. The ice is heavy and sound, showing no signs of having been honeycombed by heat. We worked through the ice in an off shore direction. In spite of the strong breeze blowing the water is quite smooth, which shows there must be a considerable body of ice outside of us. At 7.45 p. m. ice close all about, and, weather coming on thick, jammed the ship into ice and stopped the engines. Position about eight miles off Round Island. Before it came down thick had ice all about us as far as we could see.

Tuesday, 8th June.—At 2 a. m. under way and working slowly through the ice under easy steam. Ice very heavy and compact inside of us; headed the ship in an off shore direction to get into slacker ice. Some water sky showing off to the eastward. Only a vessel specially constructed and fortified for ice could stand driving at it as we did this morning. Had a light fall of snow for a short time during the morning. At 10.15 a. m. got into some open ice and proceeded full steam; passed Wolf Island about ten miles off at 8.30 a. m. Steamed in a northerly direction all day; at times the ice being close had to slow down; at other times it seemed to run abroad, when we made good headway. Weather overcast all day with occasional snow flurries. At 7 p. m. we were well off shore and standing to the north-east to get on the outer edge of the ice field. The night being thick, with snow at intervals, stopped the engines at 8 p. m.

Wednesday, 9th June.—The night was overcast, with sleet and snow; clearing a little at 3 a.m., and the ice slacking, got under way and steamed ahead, generally in a north-easterly direction. Ice getting much heavier. At 7.30 a.m., ice closed ahead; stopped ship. The ice we are in now is much heavier than anything we have so far seen. At 8 p.m. fast in the ice all day. The ice outside of us is of unusual heaviness for these waters. We measured with the lead some of the spurs which projected under water from one side of the pan to which we were fast; there was three fathoms of water over the spurs which themselves seemed to be many feet in thickness. As far as can be seen from the masthead, this ice extends to seaward of us and the sky shows no sign of open water; between us and the land the ice though tight is lighter. A few bergs can be seen to seaward. Towards night the weather cleared up and it began to freeze hard. The high hills inshore are visible about twenty-five miles off. Crew are engaged this day in moving coals from the main hold to the bunkers. Most of our men have been north before, either with Captain Gordon in the "Neptune" or the "Alert," or with Peary in the "Hope," or on whaling vessels; they are all of the opinion that the conditions are of unusual severity, and that the ice we are now in is Baffin's Bay ice. Through this, there is under the present conditions no chance of penetrating, and we can only trust to a change of wind from the south of west to loosen the ice.

Thursday, 10th June.—At 2.45 a.m. no change in the conditions. Hard frost last night. At 7 a.m. began to shift coal in the bunkers. Sounded at 9 a.m., found 50 fathoms, so that we are on a bank; bottom, hard gravel. Bottom temperature 29 degrees. Latitude 54 degrees 7 minutes. No sign of open water anywhere; towards evening came on thick with milder weather and a light air from the south south-east.

Friday, 11th June.—Same conditions, no change, thick fog, calm, no sign of open water. Ice appears to look more porous and water soaked. Fog was less dense during the middle of the day, but closed down again at sunset. Bottom is seventy-five fathoms; shows but little drift, line up and down. Tried for fish but got nothing.

Saturday, 12th June.—Same conditions; packed solid all around. No wind, fog continues. Sounded in eighty-eight fathoms. Temperature at bottom $29\frac{8}{10}^{\circ}$; surface 31° . Drifted to the southward slightly. From an observation this noon, it seems we have drifted to the south about twenty miles since we were beset on Wednesday. This p.m. the fog lifted for a short while, and quite a heavy swell was perceptible in the ice, which loosened somewhat about the ship. Came down thick again at 4 p.m. The swell subsided and the ice again packed closely about the vessel with a good deal of grinding and groaning. While the weather was clear, no open water could be seen, but the ice blink to the eastward was distinct. Wet and thick all evening. Crew engaged to-day in cleaning up the ship.

Sunday, 13th June.—A good deal of swell perceptible in the ice to-day; for short intervals the fog lifted, and the ice slacked about the vessel. At 7 p.m. began to see lanes of open water to the south-east. Fog closed down again at 8.30 p.m.

Monday, 14th June.—Heavy swell during the night and the vessel was pounded a good deal. The swell subsided at 4 a.m. Thick all night. At 9.15 a.m. weather clearing. Got under way and steamed in a south-easterly direction, through some very heavy ice, much of it reaching above the rail. At 11 a.m. ice closing in again all around; stopped the ship as we were making no progress; came down thick again. Crew engaged taking in fresh water from the ice. One hundred and twenty fathoms no bottom, 29° .

Tuesday, 15th June.—Strong north-east, with rain from midnight. Ice set tight about the ship; no swell; barometer fell last night to 29.6° ; we hope that when the glass next rises, the wind will haul to the westward and set the ice off shore; same weather all day and evening with heavy showers at intervals; 64 fathoms; 29° at bottom.

Wednesday, 16th June.—Same conditions continue with fog and rain; 55 fathoms at 7 a.m. Ice closely packed around the ship; the ice is in large pans; it is old heavy ice of great thickness, much of it floating six or eight feet above water; wind this after-

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noon from the north-east. When the fog lifts a little we see no signs of open water in any direction. Fog and rain continue to midnight. Ice close packed all about.

Thursday, 17th June.—Shortly after midnight heavy swell came on from the south-east and ice began to run abroad; at 2 a.m. got under way to clear ship from the pans; heading the ship in an easterly direction under easy steam; rain, snow and fog; passed through some very heavy ice, much of it from twenty to forty feet in thickness; worked our way at varying speed through the leads; ice gradually opening out; at 9.15 a.m. more open water and lighter ice; went ahead full speed north north-east; still thick with snow flurries; heavy swell from the south-east; wind veering to the north; in the afternoon the wind backed to the south south-east. By 6 p.m. came down quite thick; at 8 p.m. too thick to run, laid the ship to for the night under middle stay-sail, head to the sea; fog and snow showers to midnight.

Friday, 18th June.—Weather clearing. At 1.30 a.m. started ahead; snow showers at intervals. At 4 a.m. came up to a barrier of light ice with open water beyond. Headed the ship out to the eastward, and got clear of the ice again at 9 a.m. The ice we passed through this morning consisted of large pans of bright blue ice having very little snow on it. This ice was extremely hard, and as the ship had to be put at it at full speed to force her way through, the pounding was very severe; snow and rain all morning. At 3 p.m. too thick to run, as we found the ice heavy all about us. The ice yesterday and to-day seems to be in lanes parallel with the shore, with open water between. On keeping off to the eastward and getting through or around one lane of the ice, we found that after following it for some time we were again headed by another. Passed to-day several unusually large bergs; those are coming down through the field ice, leaving long lanes of open water behind them. The field ice which we have been passing or skirting to-day is old and heavy, many of the pans floating four and five feet above the water, showing that they must be from twenty to thirty feet in thickness; this ice is blue and hard, and from most of it the surface coating of snow is gone. At 4 p.m. wind freshened from the eastward; set stay-sail and let the ship drive towards the north-east in the ice.

Saturday, 19th June.—Heavy roll all night. At 2.45 a.m. got under way and stood out to the eastward through the ice; made the eastern edge of the ice at 7 a.m. Had a rough time, and got a good many severe knocks coming out of the ice in a heavy sea. The ice was heavy, showing signs of much grinding and washing, all snow being gone from it. As soon as we were well clear of the ice, stood away along its outer edge, at first to the north-east and later to the north. Heavy roll all day. Got fore and aft canvas on the ship to steady her. The glass had risen from 29.7° at 6 a.m. to 30° at 3 p.m. Wind freshened again from the north-east. Came on thick, no ice in sight outside of us before the fog closed down. Stood on to the north, stopping or slowing down at intervals as the weather got thicker. Passed several large bergs. At 11.45 p.m. fog being too dense to see anything ahead, stopped the ship.

Sunday, 20th June.—Weather clearing at 3.45 a.m., went ahead slow, continued thick at intervals all morning. At 6 a.m. going half speed. Wind which was from the north-east yesterday is now hauling to the north north-west. At 1.30 p.m. weather clearing; sighted high land inside which we took to be Cape Mugford. Headed in for the land intending to call at Okkak for an interpreter, as it is reported that the ice seldom hangs very close about this place, and there is always a better chance of getting in here than elsewhere on the coast. We are now, at about 1.30 p.m., forty miles off the land. Stood right in for Table Head, but when within twenty-five miles of the land, met closely packed field ice which seems to extend to the shore though the base of the land was obscured by fog. To the northward the ice extends much further out. Seeing no chance of getting the ship in here, put about and stood out to the eastward keeping along the edge of the ice. Inside of us, north of Cape Mugford, we can see many bergs, some of enormous size. The afternoon had been bright and clear, but at 7 a.m. fog came down again. Clearing again at 8 p.m. Had a fine, clear night, as light as day; could easily read on deck at midnight, there being a rosy margin of light along the northern horizon.

Monday, 21st June.—Stood along the outer margin of the ice at 3 a.m.; ice heading us off, stood more off shore. At 6 a.m., being about forty miles off shore, high land quite visible. Ice still heading us to the eastward, had to stand to the south south-east to get round a large field of ice which quite barred our passage. Finally got round at 11 a.m. and came back to a north-east course. This ice was heavy and solidly packed; numerous bergs and growlers in it. Weather fine and clear. Kept along the edge of the ice all day. At noon to-day were a little north of Nachvak and about eighty miles off shore. Found the ice heavy when we got near the main body of the field. Off the points, round which we have to steam, the ice seems lighter and more worn. We have had two very fine days—the 20th and 21st; the weather warm and pleasant; it seems to be telling on the ice. Sounded at noon—120; no bottom. Temperature at 120 fathoms 30°, at 60 fathoms 29·8°, and at the surface 31°. We have seen more signs of life about us to-day than at any time since we left Halifax, in the shape of birds, porpoises and a few finner whales.

Tuesday, 22nd June.—The night was fine and clear as day. Stood along the edge of the ice field until 5 a.m., when, being slightly to the north of the 61st parallel, we decided to take the first fair looking lead that offered and head in for the mouth of Hudson Strait. Did so; found the ice running abroad a good deal as we got into it. Ship running full speed through it save, when to turn quickly, we had to slow or stop, but always to go ahead again at once. The ship showed herself to be wonderfully handy, turning and twisting her way round the floes at full speed in a manner that was surprising for a vessel steaming at the rate of 8½ knots. The bulk of the ice we are passing through this morning does not seem to be more than one season old; it is from five to six feet in thickness, and scattered through it we have a few bergs, numerous growlers, and a good deal of heavier or old floe ice. Weather clear and pleasant. Being Jubilee Day we hoisted all our flags and made as great a display as possible. We noticed a good many small, flat, smooth pans of ice among the floes which seemed to be of quite recent growth. These pans are not more than ten inches or a foot in thickness, and this ice can only have been made in April or May. I should say that the open pools among the heavier ice have frozen over quite recently. This thin ice is more porous and not as solidly frozen as the older ice. Kept steadily at it all day; ice which looked solid ahead running abroad as we came near it and giving us famous leads; now and then a slight bar might be in our way, but we had seldom to charge it twice. The behaviour of the ship charmed us all, especially her wonderful handiness in sweeping round the pans at full speed and insinuating herself between the narrow leads or cracks and forcing easily and gracefully a passage ahead. At 5 p.m. we emerged into a large lake of open water, showing to the south and west no ice as far as we can see, though this was not far, as beyond was a bank of fog. It was under this bank that we expected to make the Buttons or Cape Chudleigh. Slowing down and stopping we took a cast of the lead—120, no bottom; pushed on and at 6 p.m. we made the Buttons through the fog. Away to the north there was also a heavy bank of fog but from the nest the top of Resolution Island could be made out. We were now quite sure of our position. The tide was just beginning to ebb and we soon had a current of five or six knots against us. When well abeam of the Buttons we sighted a considerable field of ice about five miles to the north, which seemed to fill up the channel, extending to the north shore. We shaped our course along the southern edge of this up for the centre of the strait and set the log at 8.17 p.m. The ice in this pack to the north is heavier than anything we have come through to-day, and it shows no open water. A few small bergs and growlers are scattered through it. It is coming down with the tide and a light northerly wind, and is setting toward the Buttons. Judging by the rate at which it is coming down, it will soon have blocked the entrance to the strait; at all events from any passage near the Buttons. As far as we can see there seems to be very little ice inside these islands. Since we hauled in, at 5 a.m. to-day, we have steamed to make the land about eighty miles in a direct line; all this through more or less open ice, through which any modern steam vessel could have safely passed though not as directly or as rapidly as we have. 9 p.m. clear water ahead. We are now abreast of the western end of the ice which we have seen north of us, and are

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making a mid-channel course. At 9.40 p.m. cleared the north-west end of the ice field, and have open water up the strait. At 10.30 p.m. ice ahead and to the south of us; fresh easterly breeze and a thick fog. Forced the ship through a narrow belt of heavy, hard ice, six to eight feet in thickness, in large angular pans; the corners are jagged and have not been rounded or smoothed by any rubbing. This belt was not over a mile in width. Weather coming too thick to run, with heavy ice about and every appearance of a dirty night, slowed down at 10.45 p.m. Clearing again at 11.45 p.m., went ahead full speed. Killed our first bear to-day, just before we made the open water off the Button Islands.

Wednesday, 23rd June.—After midnight we were gradually headed off towards the north by a heavy field of ice to the southward; getting too close to the north shore we had to enter a lead which offered and stood out more towards the centre of the channel. This lead did not go far, and from 2 a.m. to 8 a.m. we were ramming and boring through the ice in a westerly direction. At 8 a.m. we emerged into open water, which permitted us to follow our course. At 9.15 a.m. ice ahead and all about us again, but there is open water beyond, which we reach after forcing our way through a couple of miles of more or less open ice. The ice which we have so far seen in the strait to-day is not much rafted, and with very few growlers and no bergs; it appears to be from four to six feet thick. This includes a foot of frozen snow. In most places it is closely packed, and does not seem much worn by grinding together; the angles and corners are jagged, and not rounded off. This ice I take to have been driven into the strait from Baffin's Bay. We passed to the north of a considerable field of closely-packed ice during the morning; at noon came up with the end of it. From here, as far as we can see from the nest, there is no ice ahead. We are, at noon, about 20 miles off the north shore, and the Grinnell Glacier is distinctly visible.

At 3.15 we came up to a wall of closely-packed, heavy ice, much rafted; this extended from the north shore in a south-westerly direction across the strait, as far as we can see. Stood to the southward, along the edge of it until 6 p.m.; it presents the same appearance all along; there is no sign of open water anywhere in it, nor can we see beyond it. At 6 p.m. the line of this immense and compact field began to trend in a direction to the S.S.E. When we came up with this barrier of ice we were nearly abreast of Saddle Back Island. At 6 p.m. made fast to the outer edge of the ice, and began to take in fresh water. We will hang on here till the early morning, and see if the ice opens and any lead presents itself. The high land of the north shore is quite visible about 45 miles off; we see quite clearly the upper part or top of the Grinnell Glacier, which fills the height of land between Frobisher Sound and this part of Hudson Strait. This glacier discharges into Frobisher Sound. The day has been fine and warm; towards evening the weather got hazy and looked a little like rain.

The meeting with this—so far as we can judge at present—impassable barrier has been a great disappointment, for hitherto we had met with no serious impediment to our passage through the strait. For hours to-day we were steaming nearly nine knots over a summer sea, with very little ice in sight, when suddenly this barrier loomed ahead. This is the most closely-packed ice we have seen. We propose to be careful and not get fast in it, but to keep along its outskirts until it loosens and begins to run abroad.

Thursday, 24th June.—At 4 a.m. no sign of open water ahead; we got under way and stood to the southward along the edge of the ice. As we go to the south the trend of the ice increases to the eastward. At one time we saw a lead which seemed to offer some chance of a passage through, but after steaming a short distance into it, we found it merely a pocket, and we steamed back and continued to the south. From the appearance of things now, it would seem that this ice barrier extends right across from north to south, and that on the south shore it extends into the mouth of Ungava Bay, and thence across in the direction of Cape Chudleigh. We altered our position but little at all while fast by the edge of the ice last night. At 9 a.m. put about and headed the ship back along the edge of the ice toward the point where we first came up with it yesterday. About 18 miles south-west from Icy Cove, a bank of fog which had shown

all morning to the south-east, came up with a light south-east breeze, and we had it thick. We, however, continued along the edge of the ice in a north-westerly direction. the crew at work shifting coal from the hold into the bunkers, as the ship was getting very much by the head. We have been burning coal rapidly since the 19th, as we have been steaming hard. Stood on along the edge of the ice until 2 p.m., when we stopped the ship and sounded in 95 fathoms, about ten miles off the north shore. The ice is solid to the shore and no open water or leads can be made out, it appears to be moving in a solid body towards the N.W. I see nothing to be gained by entering this ice, it is more or less heavy, and closely packed, and is drifting in the direction in which we wish to go. I prefer to remain on the outer edge of it, and to wait and watch for eventualities. The fog has lifted along this shore though it still holds to the southward. At 8 p.m. we steamed further off shore and put the ship a little distance into the ice for the night, passing a line about the nearest hummock. We are drifting steadily with the ice in a north-westerly direction, having gone by the land about six miles since 11 a.m. yesterday. Light easterly breeze, fine and clear.

Friday, 25th June.—At 3.45 a.m. decided to try and force our way ahead. Ice seems to be pretty solid, but here and there are patches of lighter ice; worked through the pack until 7.35 a.m., when finding it heavier and more solidly packed, we were forced to stop the ship, as there is no give to it. It shows no disposition to open in lanes or to run abroad as it would if it were not bound from shore to shore, therefore, I consider that any vessel, no matter how powerful, must eventually be jammed in it. Our drift last night was small, but it was somewhat to the southward. I am of the opinion that the ice we are now in is the ice from Hudson Bay and Fox Channel. It varies in thickness from three to twelve feet. There is not much rafting, and few or no growlers, and there are no bergs inside in the ice. The day is hazy and damp, with a light N.E. wind. Ice close about the ship all day; we have drifted a little up the strait to the westward. From the crow's nest we see the high land at Big Island, which we make to be about 50 miles away. At 6.30 p.m., ice seeming a little slacker, went ahead at once, and made fair progress. Some of this ice was comparatively thin and rotten and we got through it at a fair speed, but mixed with it were large heavy pans against which we brought up solid. These we had either to slew around, or back off and ram at. There is also a good deal or what I would call *batture*, or rafted ice. The ice we have passed through to-day has never seen any hardship. There does not seem to have been any swell or sea through it, and I am certainly of the opinion that this is ice from the inside to the westward, and not from Baffin's Bay. It is quite different from the ice we have met along the Labrador, or which we have steamed through in entering Hudson Strait. Had a little rain this evening. A good heavy warm rain would tell on this ice more than anything else. Made fair progress until 10.45 p.m., when brought up solid, the pans are large and heavy, did a good deal of backing, and ramming but made no perceptible headway, stopped the ship till the ice again slacks.

Saturday, 26th June.—No change in the condition. Blew fresh at intervals, from the east north-east, the ice is driving slowly up the strait. As the narrowest part of the strait is just ahead, from Big Island over to Prince of Wales Island, it is to be expected that the ice will tighten as it drives up. All my officers who are old hands, accustomed to ice, say that this jam is too tight to work through. There is certainly no give to it as it is at present. Eight p.m. strong east south-east to-day. The ice behind us has shoved and packed up and we are fast fore and aft. We had to-day to set off a number of blasts to protect our rudder, it was relieved for the time, but the pressure continues. The ice we blasted was from 10 to 15 feet thick. We can see open water behind us but none towards either shore or ahead. The appearance indicates that there is an immense field of ice ahead of us up the strait. We have had no westerly wind of any moment since we left Halifax.

Sunday, 27th June.—No change. Still fast and drifting a little to the north-west. Saw Big Island at 6 a.m. likewise the loom of the land on the south shore, no sign of open water except that east of us. Day warm and bright; ice melting considerably. The ice seems to slack off with the ebb and tightens up again with the flood.

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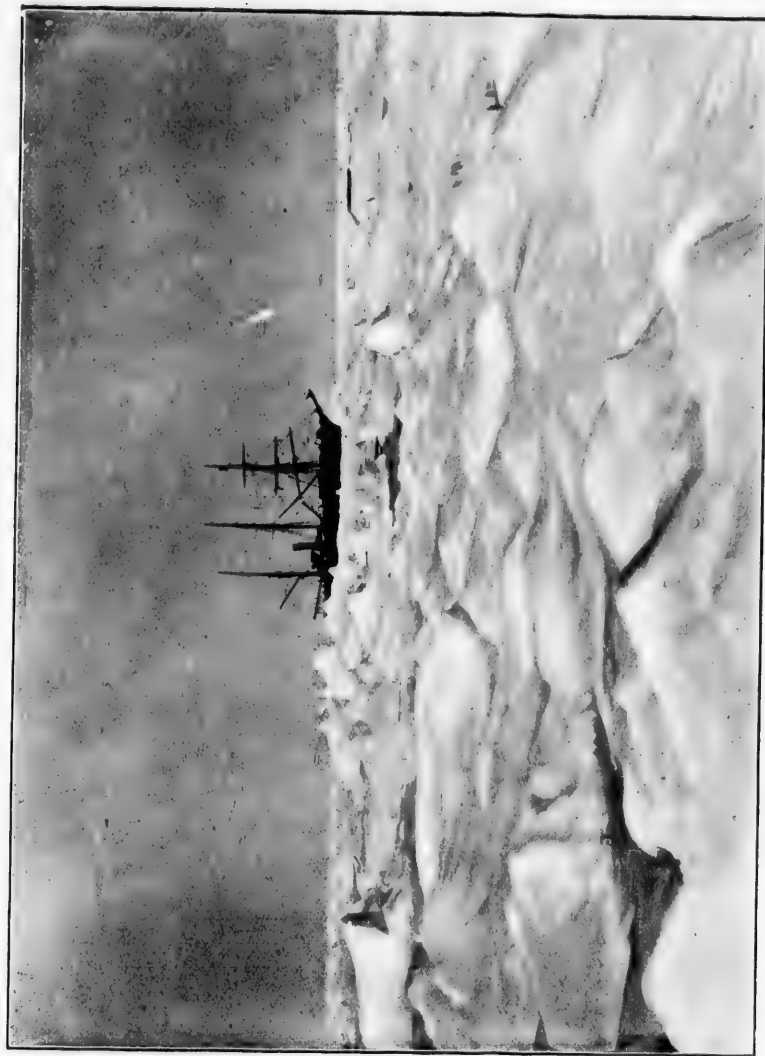
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DRILLING HOLES IN THE ICE TO PLACE BLASTS TO RELIEVE PRESSURE ON
RUDDER AND STERN (JUNE 30). [13]



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SS. "DIANA" IN ICE—LOOKING SOUTH (JUNE 30).

SS. "DIANA" IN ICE-LOOKING SOUTH (JUNE 30).

[13]



LOOKING NORTH (JULY 2)

LOOKING NORTH (JULY 2).

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LOOKING EAST—SHOWING PRESSURE RIDGE BETWEEN TWO PANS (JULY 2).

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Monday, 28th June.—It froze quite hard last night. Pools were all covered over this morning with a coating of ice a quarter of an inch thick. This ice has melted again by 10 a.m. Men who went over the ice some distance from the ship, reported it very heavy and a good deal rafted. Crew engaged filling tanks and casks with fresh water.

Tuesday, 29th June.—The day begins warm and mild. Ice shows some sign of going abroad. The fine weather of the last few days has told considerably on it. Sounded to-day, 135 fathoms, bottom 29 degrees; at 55, 29 degrees 3 minutes, and at the surface, 33 degrees, bottom hard. At 3.15 p.m. a light swell began to heave in from the southward, got under way at once and forced ahead; found the ice had softened and broken up considerably, there were large pans of solid ice which we had either to work around or ram at. At 5.45 p.m. came up with a barrier of heavier ice which we could not penetrate. There seems to be a jam just at this place, of heavier ice which is much rafted, the pans are large many of them being over a mile in circumference, the ice is also coming together again. Tried for some time to free the ship as the ice we were in was rather heavy to lie in from choice, but we failed to get her cleared, as it came together too quickly. This evening sent out hands to measure the thickness of the pans about us. They run from five to nineteen feet, that is, measured from the bottom of the pan to the surface of the water. This ice floats from one to five feet above the water, the greater height being due to the rafting. The ice all about us, especially that ahead is greatly rafted; being piled up in every conceivable form and shape it is exceedingly difficult to get about, over or among it. Through this ice in its present state, no vessel could possibly penetrate. We can see land clearly to-day on both shores. Big Island and the bay behind it to the northward, and the land on the south shore from Stupart's Bay to the westward, but no open water is visible nor is there any water sky. I should consider that the heavy ice now ahead of us has been formed by the forcing of ordinary field ice on shore or by the meeting of fields of ice set together by opposing winds or currents; this has caused rafting. From the soiled condition of this ice I should say that much of it was more than one season old.

Wednesday, 30th June.—Fresh E.S.E. breeze since midnight. Ice closely packed all about. At noon sounded, 137 fathoms, 29° at bottom; 29° at 57 fathoms and 33.5° at surface. At 1.15 p.m., ice is apparently slacking a little; got up steam and forced our way ahead, ice opening up more as we get on. The pans are of great extent and thickness and it takes a long time to swing or work around them. Continued working through them until 6.15 p.m., when ice closed together and ship could make no further progress. We are now well up to and about 15 miles off Big Island the eastern end of which is abeam. The day has been raw and cold with strong wind from the E.S.E. At 9.30 p.m. ice began to raft and shove about the ship, we got pretty severely nipped. One large pan was forced under our port quarter, and the vessel was lifted by the stern about 4 feet. She strained and groaned a good deal. The pressure continued and caused a good deal of anxiety as the ice was so heavy that we could do nothing.

Thursday, 1st July.—The pressure continued until 1.30 a.m. When the shoving ended the ship settled down and became again water-borne. The ice has rafted up considerably during the night with the strong S.E. wind. At 10 a.m. the shoving began again. We now have our boats prepared and crews told off in case we have to leave the ship in a hurry. 7 p.m., have not had any more shoving since noon, the ice seems packed on all sides as tightly as it can be, it is rafted all around us. We have been carried with the ice much nearer Big Island than we were last evening when we first got jammed. It was thick all day until about 4 p.m., when it cleared up and got much colder. Wind still fresh by spells from the S.E.; ice tight and rafting all about. Ship hove over to starboard by passing of a pan under her from port quarter. She is lifted bodily about 4 feet out of the water.

Friday, 2nd July.—Not much shoving during the night, but at 9.45 a.m., a heavy pan which was astern of us came up suddenly with the tide and wind and, driving all the smaller ice either to one side or asunder, took us fairly in the stern, our rudder was twisted to one side and broken off a little below the water line: the ship was driven

forward as far as she would go into a heavy pan ahead of her. The ice rafted up on both sides of us; it was doing this all about. For a while we stood helplessly by, expecting that the next shove would take the stern off her, but fortunately the force of the shove was spent and we took no further harm. All hands had previously been told off to the boats, supplies were on deck ready to be thrown over on the ice, and waiting in this way we spent the morning until the turn of the tide. It was blowing a fresh breeze from the S.S.E., puffy and with a tendency to haul more to the south. We are about 8 miles south from the eastern end of Big Island. At 6.15 p.m. two Esquimaux men and three women came on board from Big Island; we had seen them winding among and climbing over the hummocks for several hours before their arrival. Two of the women carried naked children in their hoods, they did not seem to feel the cold, though we were all muffled up and shivering, as the weather was raw and chilly. They could not give us any information about the ice; they had very little with them and seemed poorly off; they told us that they had left others of their party ashore on the island; we gave them food and tobacco. The ice set tight about us again this evening and we were again hove over and raised by the pressure of the ice under us; still there was no more shoving, and at midnight all but the watch retired, feeling more secure than we had been.

Saturday, 3rd July.—At 4 a.m. ice again showed signs of going abroad; immense lumps began coming up from under the ship and she was soon afloat; the pan which did us all the damage yesterday was about three-quarters of a mile in circumference, and by actual measurements at several points, from seven to twelve feet in thickness. We measured the ice with a pole to which a foot piece had been put on at right angles. This was a level pan and it had not been rafted to any great extent before it shoved up on us. At 4 a.m. five more Esquimaux came on board; a man, woman and three partly grown children; we had to feed them on their arrival as they were tired and pretty well exhausted after their journey from the shore over the ice. They told us that one of their number was killed a few days ago by the bursting of a gun; they cannot give us any information about Capt. Spicer and his whaling station a few miles west of here. As the ice slackened about us we overhauled our damages; the ship is tight and not hurt in the hull; the rudder is broken and twisted off at the water line, the two upper pintails being broken off; the stock of the rudder which was twisted through is a piece of oak fourteen inches square. We forced the lower part of the rudder back into position, and secured it temporarily with an iron strap; we will not ship a new rudder until we get out of the ice. The ice slacking a little, got up steam and changed our position, working about a mile ahead into what seemed to be a softer spot. We can distinctly see the high land of Prince of Wales Sound from the nest, but no open water can be seen anywhere. The ice is still setting up the strait and at 10 a.m. we can make out the beacon on the bluff of Ashe Inlet; the inlet itself being broad off our starboard bow. For the first time since we have been in the strait we are having a light air from the westward. The glass which had fallen $\frac{1}{10}$ ths yesterday has risen to day. We have invited our Esquimaux guests to leave us and go ashore but they made no attempt to do so. Our Esquimaux left us at noon, they had with them some very good specimens of mica which they brought from somewhere round the shores of Baffin's Land behind Big Island. They managed to explain to us before leaving that there was no one at Capt. Spicer's old station, and that he had left there a long time ago. The ice slackened away again about 4 p.m. and we steamed on a short distance to avoid some heavy pans which were unpleasantly near. We made fast to a small pan among what seemed to be lighter and softer ice, but these extensive and heavy pans are all about, and when the tide changes they sail over or through everything else, so that it is difficult to avoid them. The glass which fell yesterday is now rising, and there is appearance of a westerly wind. This is what we want to open out the jam ahead. Sounded in 160 fathoms; temperature at bottom and midway down 29°, at the surface, 33°, in the air 40°; hard bottom.

Sunday, 4th July.—About 12 a.m. the wind sprang up from the south-east with rain and fog and the ice packed tightly about the ship. Barometer falling. At 7 p.m. the ice set very tight all about the ship, but she is well placed with a soft pan on her starboard side and is not nipped. Wind blowing in puffs with heavy rain, can see no distance

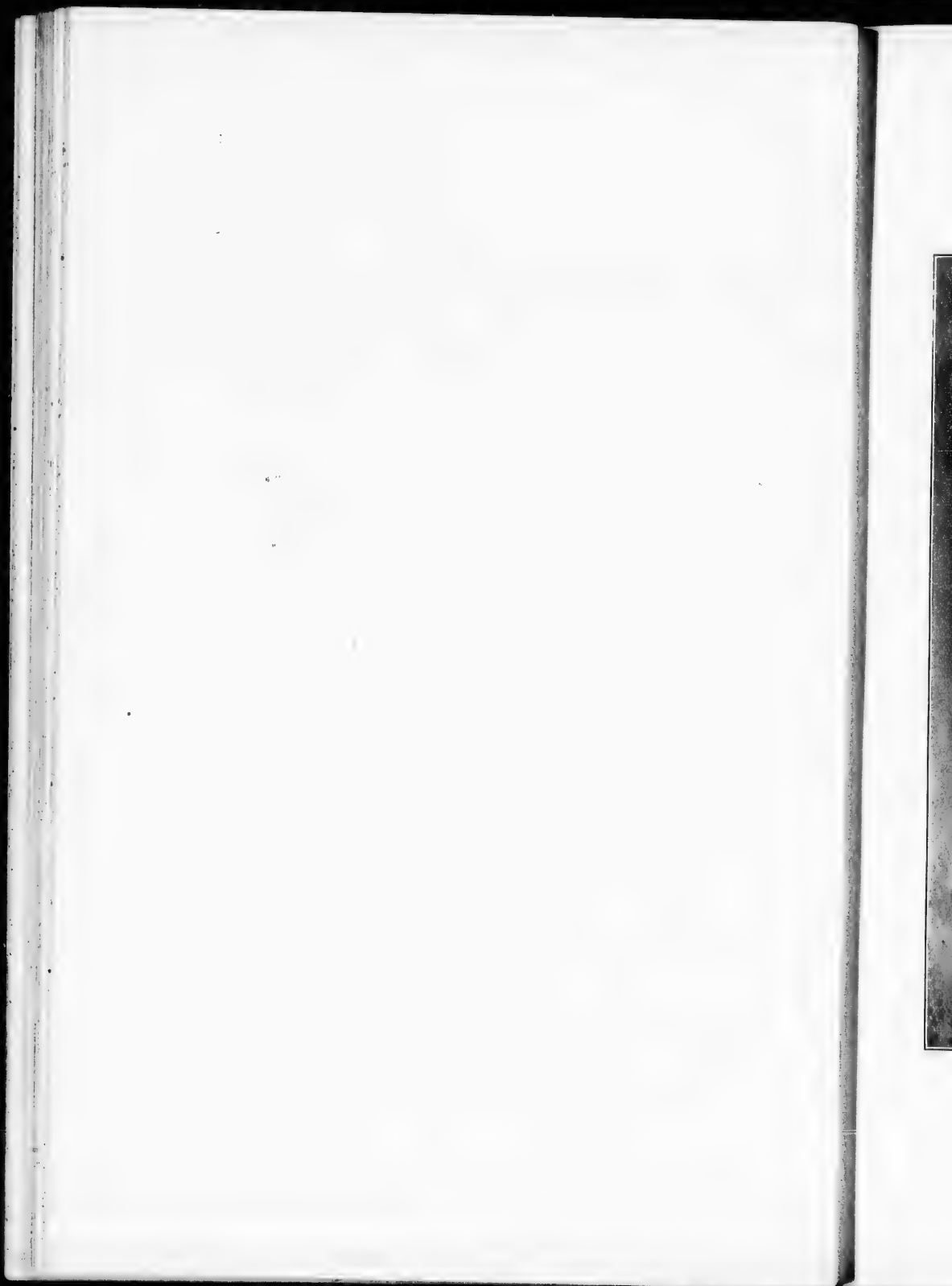
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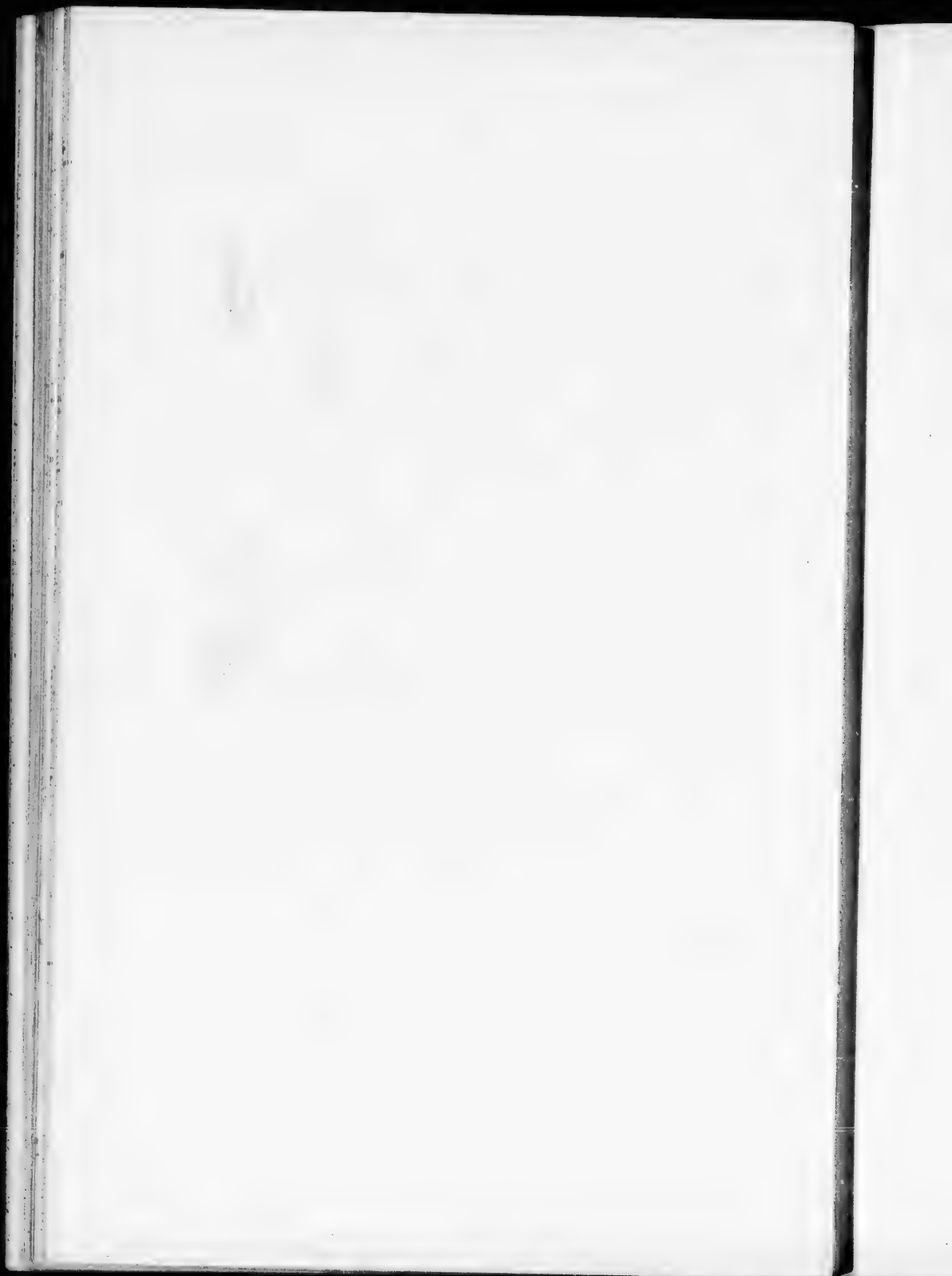


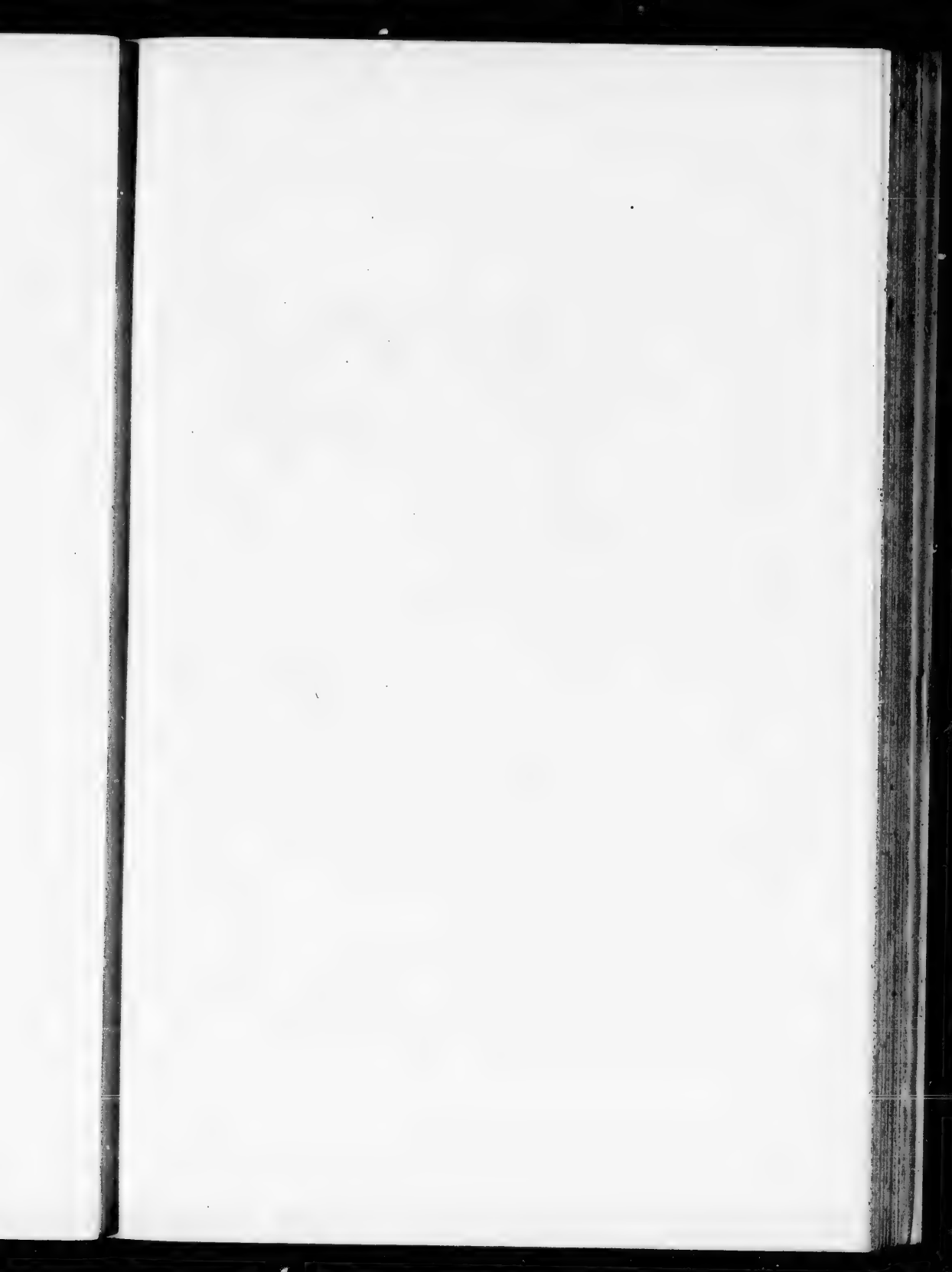
ESQUIMAUX FROM BIG ISLAND—SEVERAL NATIVES CAME TO THE SHIP OVER ABOUT 10 MILES OF ICE (JULY 3). [14]





EAST END OF BIG ISLAND, HUDSON STRAIT (JULY 3).







LOOKING EAST (JULY 8).

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from the ship. At 8 p.m. had a very severe nip; squeeze came heaviest about the fore chains. The between deck and the main deck were hove up and began to leak; the fore rigging hung quite slack and the ship strained and creaked terribly. The pressure kept up until 10 p.m. The ice banked up on the port side level with the rail, while on the starboard side it broke off and passed under the ship, she was finally lifted about five feet out of the water and the pressure was relieved. For a time we were very anxious and stood ready to leave the ship.

Monday, 5th July.—Ice began at 8 a.m. to slack away from the ship. Easterly to south-west winds with rain and fog at intervals; towards evening the fog lifted enough to let us see Big Island. We found we had drifted about ten miles to the north-west, and that we were now about five miles off the land, a little to the west of the beacon. In the evening the ice began to come up from under the ship in large quantities and she again became water-borne. The glass which had been falling since yesterday is beginning to rise. No sign of open water anywhere; as far as we can see the ice is closely packed and greatly rafted, though there has been no rafting to-day. The ice is evidently spreading out to the eastward, and the pressure against the shore of Big Island is being relieved.

Tuesday, 6th July.—With the rising glass we had hoped for west to north-west wind and clear weather, but this has not come. About 3 p.m. it began to blow half a gale from the north to the north-west, with snow and sleet. The ice is closely packed about us, but there is no rafting or shoving. We are now on the windward side of the ice, so that there being no great body of it between the ship and Big Island we are not in much danger of a nip. If the wind continues we would hope for a lane of open water, or for slack ice along the shore to the northward. The ice about us is heavy, most of it being by measurement from six to twenty feet thick; there are no bergs or growlers visible. At 2.20 p.m. ice ran abroad a little and we at once began working our way ahead through the pack until 4.30 p.m. when it closed down with no sign of an opening ahead, we stopped the ship in what seemed to be a soft spot. The ship is coming to herself again to-day, the rigging is tightening up of its own accord, a close examination shows the deck seams started in many places, the deck about the galley, just abaft the foremast, has been started up from the beams; the rain now pours through many places all of which were quite tight before the nip. We repaired the rudder by respiking the iron plates on either sides, this has stiffened it somewhat. At 6.30 p.m. moved the ship into a better berth by backing and filling through the ice, as two heavy pans had ranged themselves along our port side. We are now drifting in a south-easterly direction with the pack.

Wednesday, 7th July.—Day begins with fog; about 10 a.m. cleared a little, and we saw Big Island. We are about twelve miles off Big Island and ten miles south-east of our anchorage. Outside of us the pack is heavier than about us, and the pans are close. Wind during the day was all around the compass. The glass at 7.45 p.m. has risen, and it is now raining hard. The ice is closely packed about us but there is no rafting. One unusually heavy pan has ranged along our port side, and we have been obliged to get rid of it by working the ship ahead and astern so as to have some smaller and softer ice about her.

Thursday, 8th July.—Wind hauled more to the north-west at 6 a.m. During the night we have been driven close in towards the shore near the easternmost end of Savage Islands. There is evidently a strong set of the tide through the channels among these islands, as we have been twice carried in this direction. Much heavy ice and large pans packed close about us. At 5 a.m., from the crow's nest, made out open water to the south, and at once began to bore our way in that direction. We found it very heavy work at first, as the pans were too heavy to swing. However, by dint of pegging away, we gradually got through, and at 9 a.m. began to find the ice looser and the pans smaller, so that we were making better headway. We remarked that all the heavy ice is rafted; in most places the rafting is clear and distinct, but in many cases where the ice is evidently old and has been rafted for some time, most likely for more than one season, it is difficult to detect the lines of separation, but a close scrutiny will show

them. We have seen pans of ice that were from 30 to 40 feet thick, but this thickness is always made up of many layers, say from six to seven of rafted ice. I have not seen in the strait any ice more than six feet in thickness of a clear freeze, and most of it will run between three and six feet. On striking one of these thick pans a sharp, fair blow, it will often go to pieces and be separated into its various layers, which come boiling up on either side of the vessel. Towards noon found the ice going abroad more, in a south-westerly direction; steamed steadily through. The wind freshened from the north-west, with fog at intervals. The "Diana" received blows to-day that no ordinary freight-carrier could have stood for a moment. At 3.15 p.m. the ice closed in and we could make no further headway. It also came down thick fog, with a fresh north-wester. We are now, at 5 p.m., about 26 miles south-west from the upper Savage Islands. The ice is closely run together, and the whole is drifting *en bloc* out of the strait.

Friday, 9th July.—Ice remained close packed all night; ship lay easily in it; there was no crushing or swinging about; the whole mass is driving steadily to the eastward, tides, currents and eddies not seeming to affect it. At 7.30 a.m. it began to show signs of going abroad. At 8 a.m. steamed ahead. The ice was tighter than yesterday, and did not go abroad to the same extent. The wind, which had been blowing fresh from the north-west during the morning, in the afternoon backed to the north-east. At noon came down quite thick, and the ice closed in, so that we could make no further headway. Burnt down the fires and stopped the ship at 12.10 p.m.

Saturday, 10th July.—Had no change in the ice last night. It was closely packed about the ship; the pans were too heavy and large to bore through. At 8 a.m. began to slack, and at 8.15 we were steaming ahead. The ice went more abroad towards noon, and we had some fine leads. Kept working along the centre of the strait, heading slightly towards the south-western shore. Ship gave and took some pretty hard knocks, severe enough at times to knock people who were not on their guard off their feet. At 6.30 p.m. sighted open water ahead. At 9.15 p.m. were clear of the ice, and steaming full speed ahead in open water. Set a course north by east to bring us 20 miles north of the eastern end of Charles Island. At 11 p.m. began to meet pieces of scattered ice, and saw ice ahead. Weather getting thick.

Sunday, 11th July.—At 12.20 a.m. thick fog and heavy ice all about ship, made fast to a pan and held on for clearer weather. At 4 a.m. fog lifted: went ahead at once. Very little broken ice, all large pans; the ice is heavier than that we worked through yesterday. At 6.30 a.m., ice is slacking again; pushed ahead at once. The ice is all made up of large pans which are heavily rafted; most of the ice being from 20 to 40 feet thick, made up of superimposed layers, each being from 4 to 6 feet in thickness. We now see the western shore distinctly, and we have dropped Big Island which we saw plainly yesterday. Towards noon the ice got much lighter and was much more gone abroad; especially towards the south shore. At 4 p.m. saw open water ahead in the direction of Wegg's Island. At 7 p.m. got out of the ice into open water, which extends all along the eastern shore of Charles Island, now clearly visible ahead. We emerged from the ice about 20 miles off the west shore land opposite Wegg's Island. The open water seems to extend away towards the N. and W. Shaped our course to pass about 10 miles off the eastern shore of Charles Island. Fine evening with a great deal of mirage, calm. East end of Charles abeam at 9 p.m., steamed along the north-eastern shore of the island about 5 miles off, the ice field being immediately outside of us to the N.E. Had the western end of the island abeam at 11.30 p.m. Shaped our course for Cape Digges.

Monday, 12th July.—After midnight met at times a little scattered ice but nothing to prevent us from going ahead at full speed; fog hanging over the high lands of Cape Westenholme. The cape is abeam at noon, ship being about four miles off the land, ice ahead, and close outside of us to the N.W.; the ice ahead is not very compact. At 2 p.m. being then abreast of Cape Digges the weather came down thick; stopped ship, made fast to a large pan, and began taking in fresh water. At 5.15 p.m. fog lifted; knocked off water and went ahead to pass down channel between Cape Digges and Mansfield

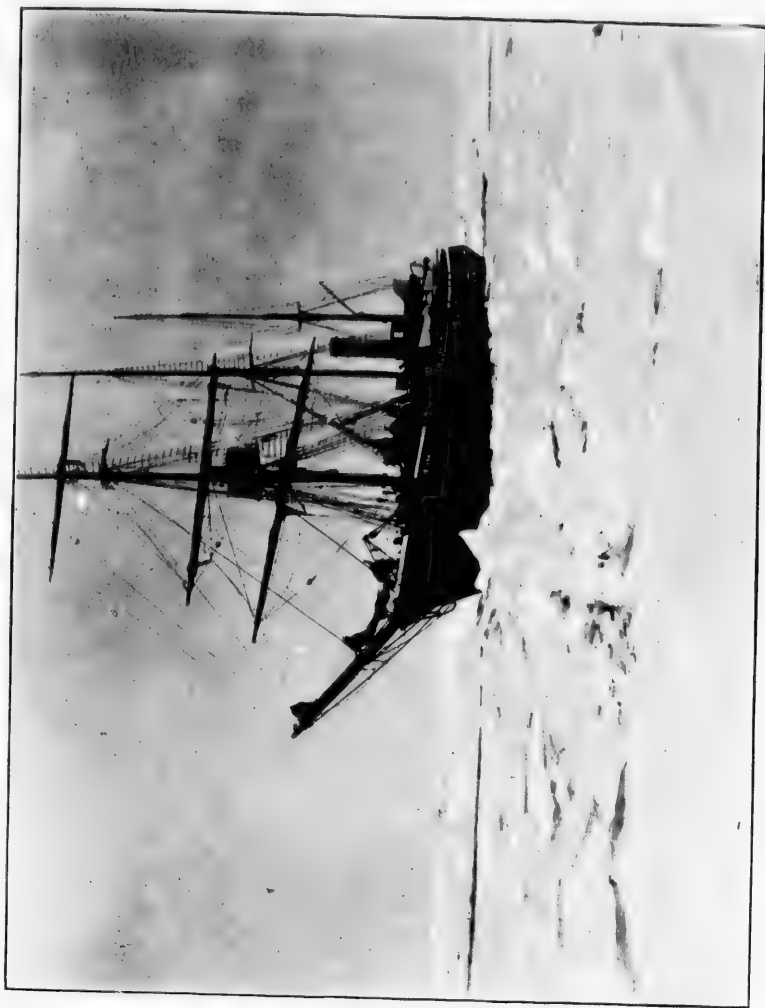
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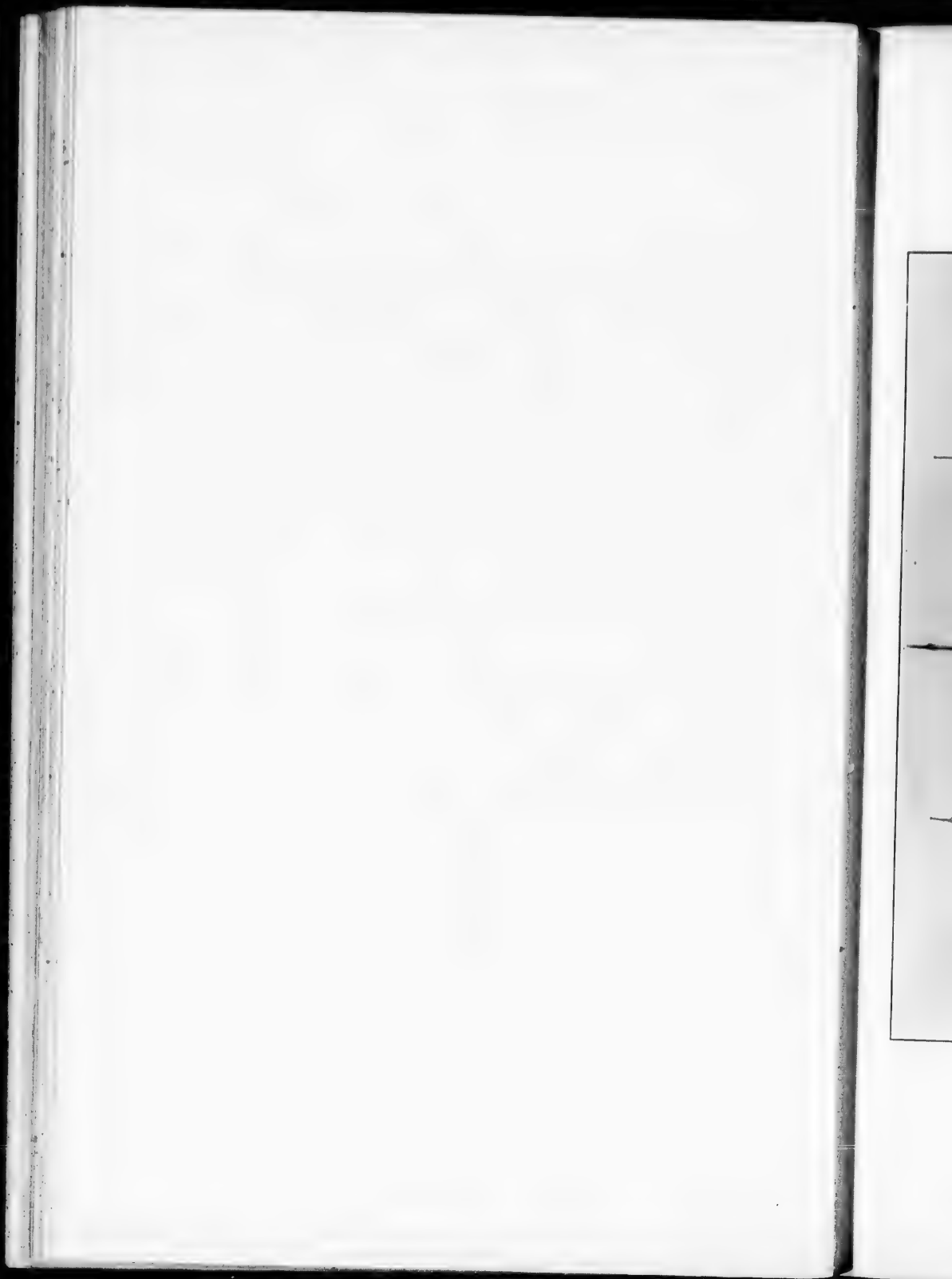
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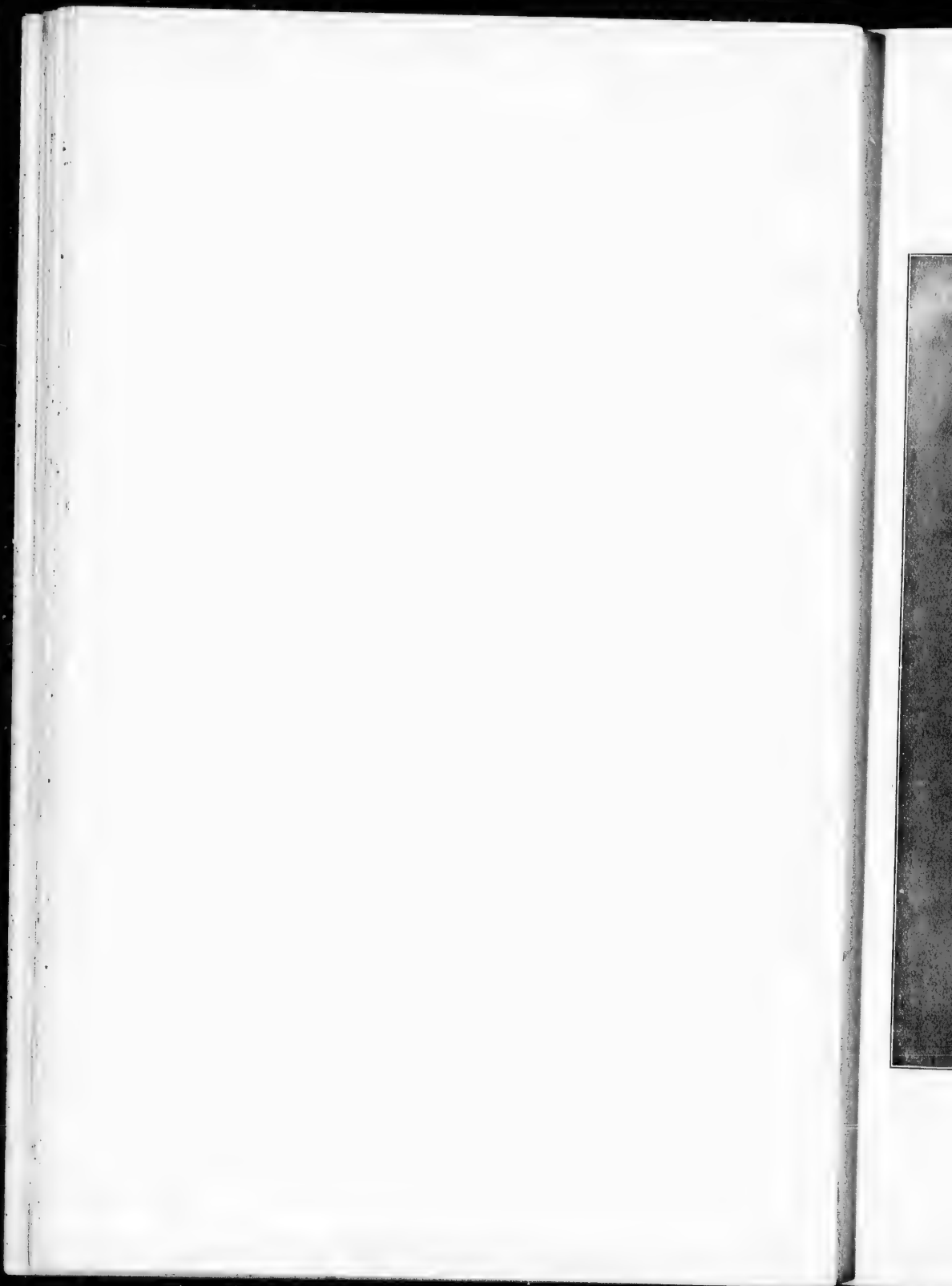


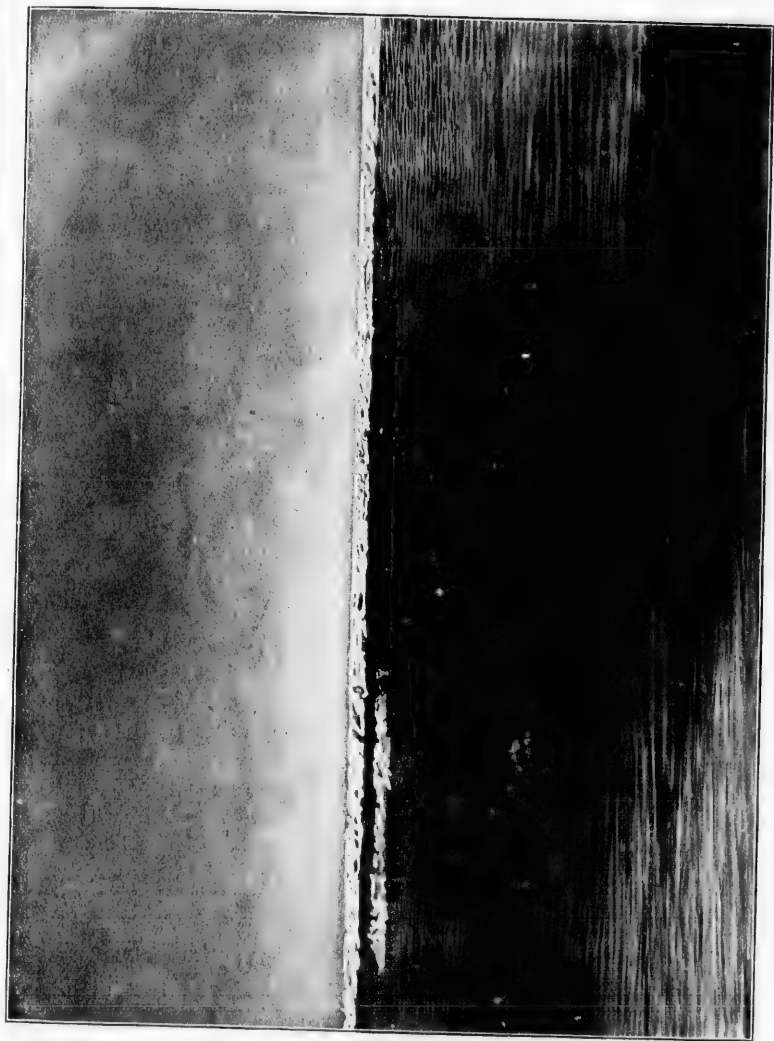
SS. "DIANA" IN ICE OFF SANDWICH BAY WORKING NORTH (JUNE 10).



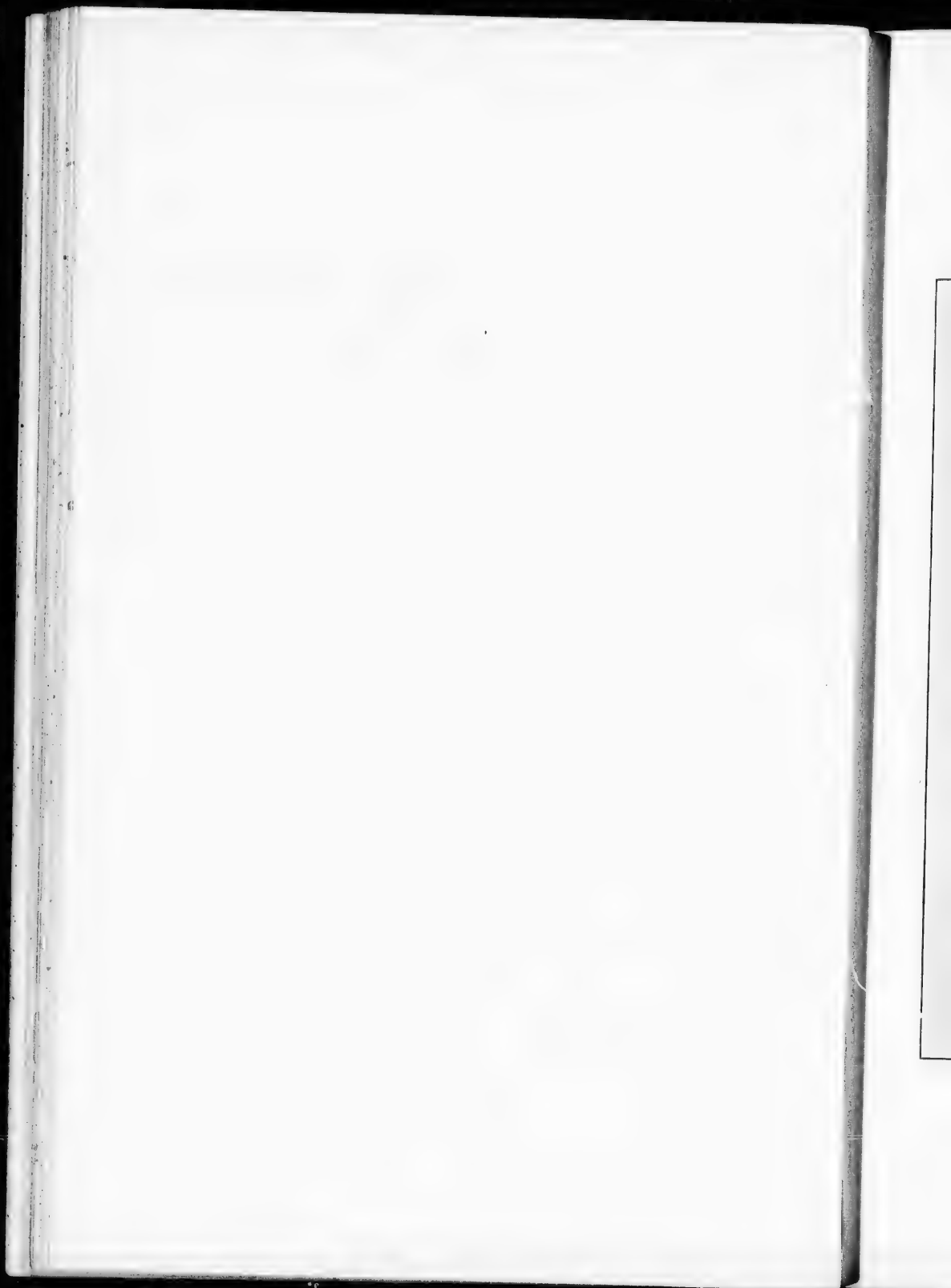


SS. "DIANA" IN THE ICE (JUNE 24).



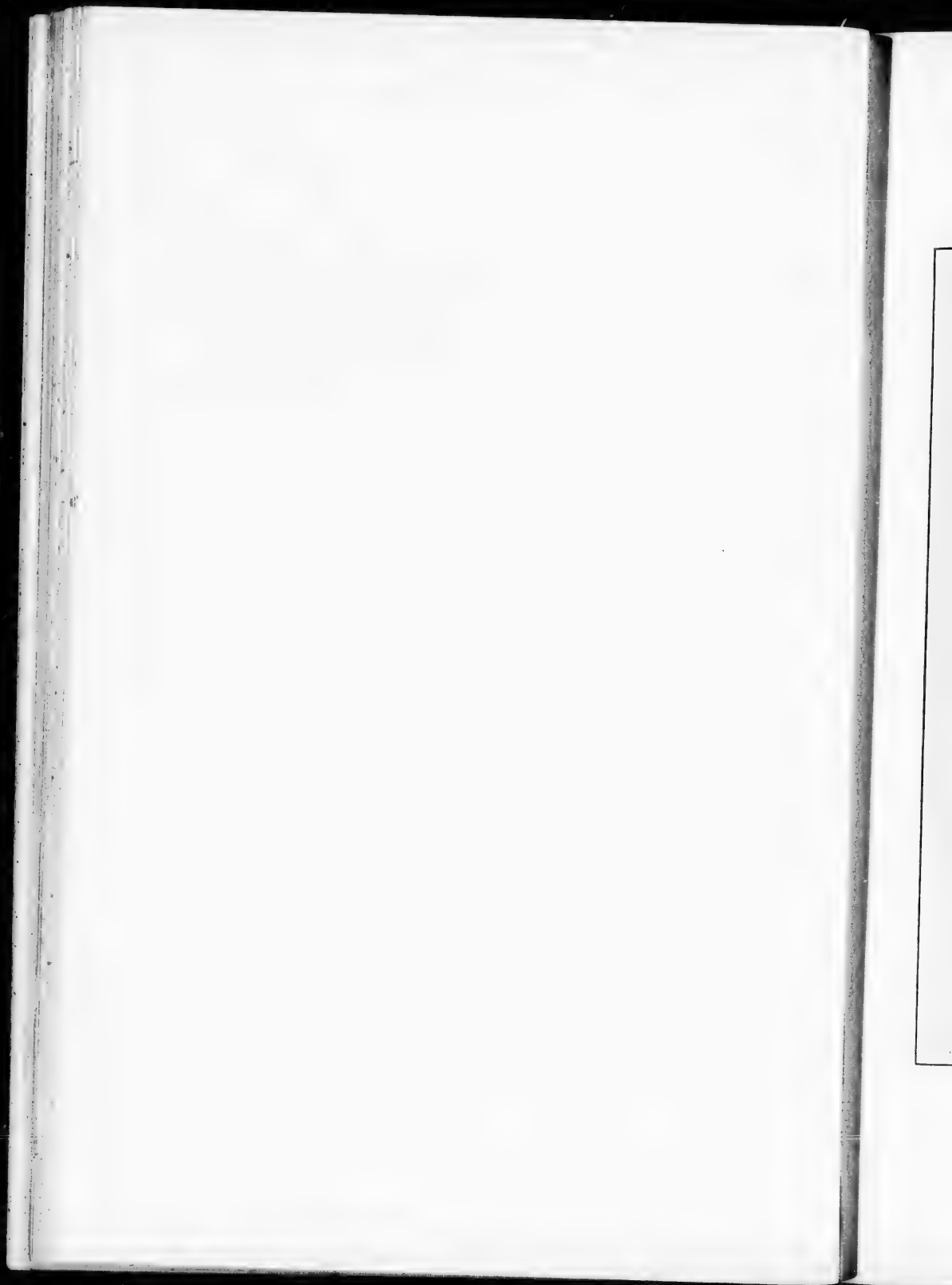


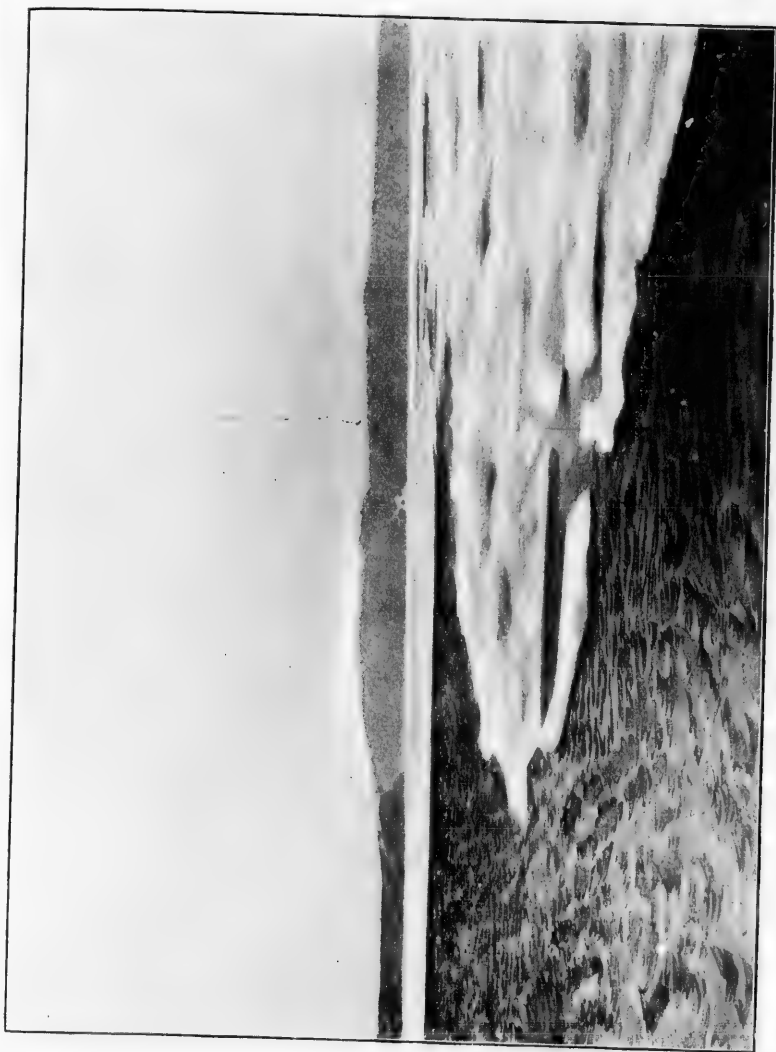
BARRIER OF ICE ACROSS THE STRAIT (JUNE '23)
Extending from Saddle Back Island on the north to Hope's Advance on the south coast.



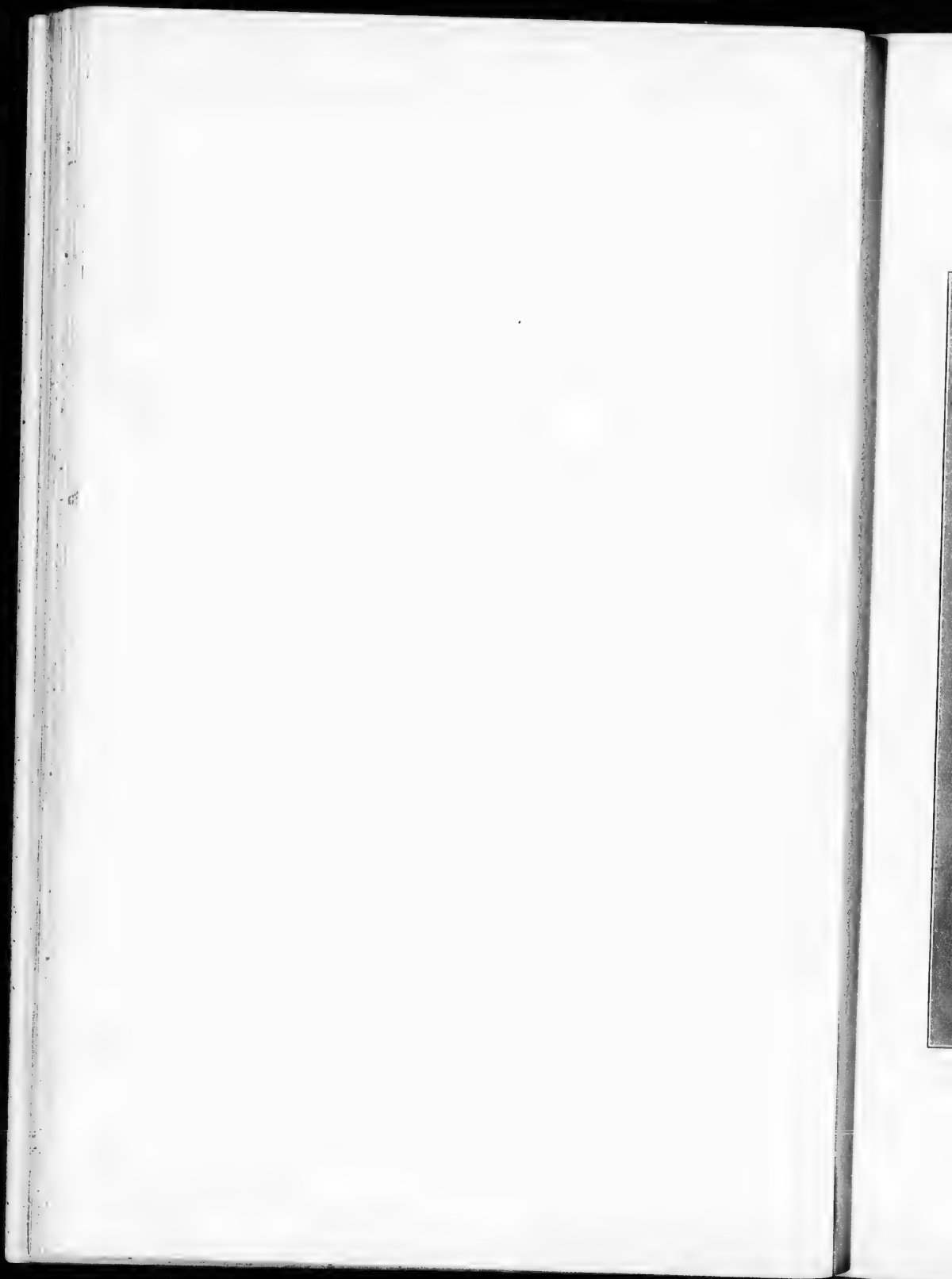


LOOKING NORTH OFF CAPE WOLSTENHOLME (JULY 12),





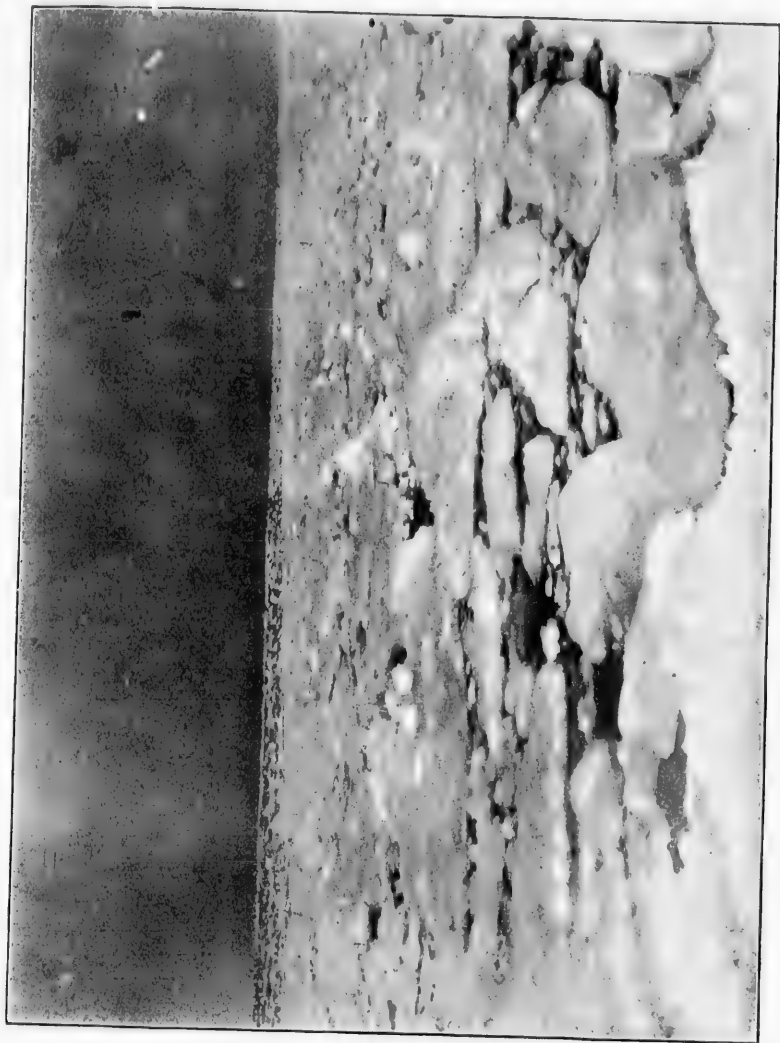
OFF CAPE WOLSTENHOLME (JULY 12).



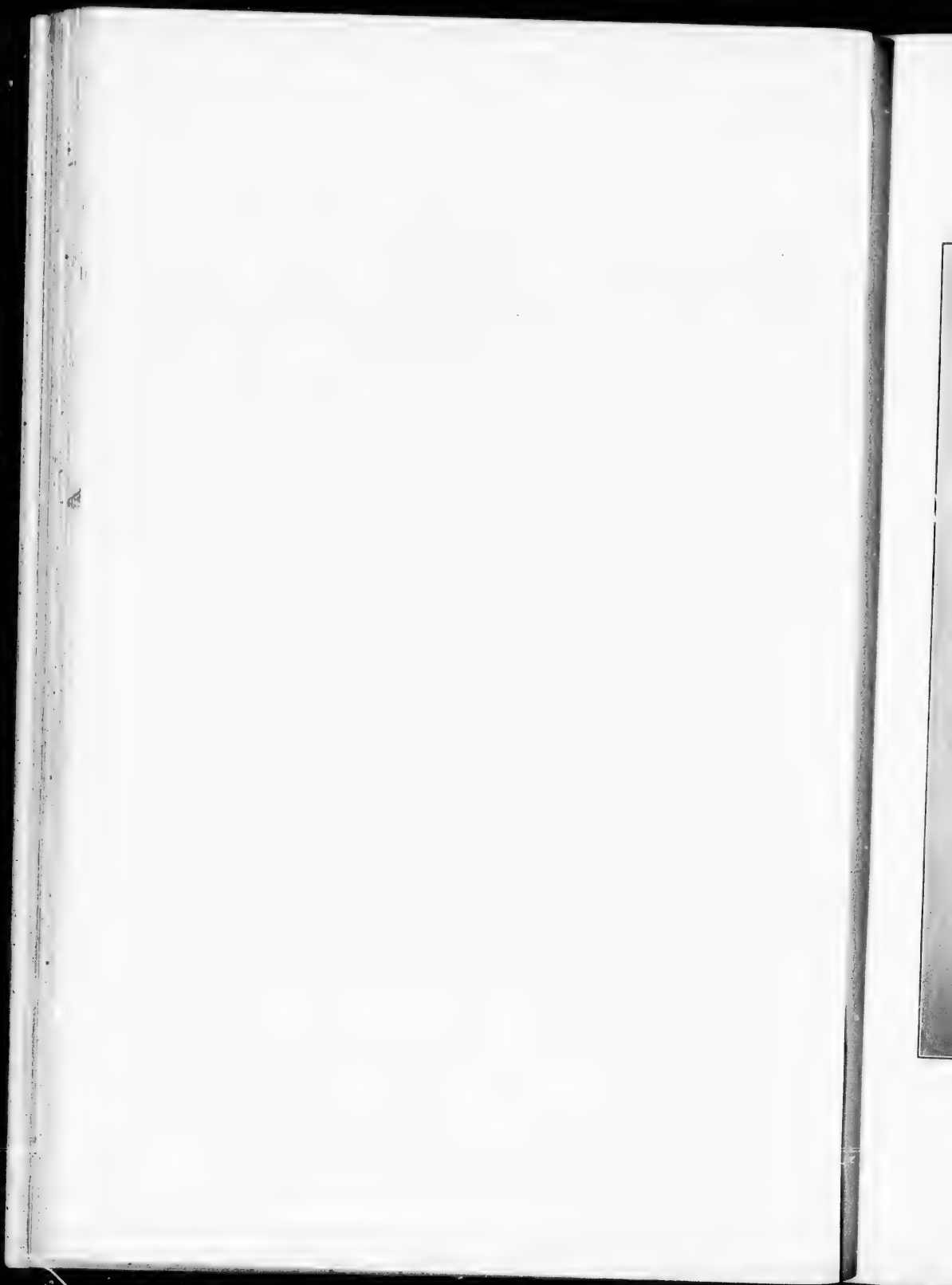


LOOKING SOUTH-EAST (JULY 9).



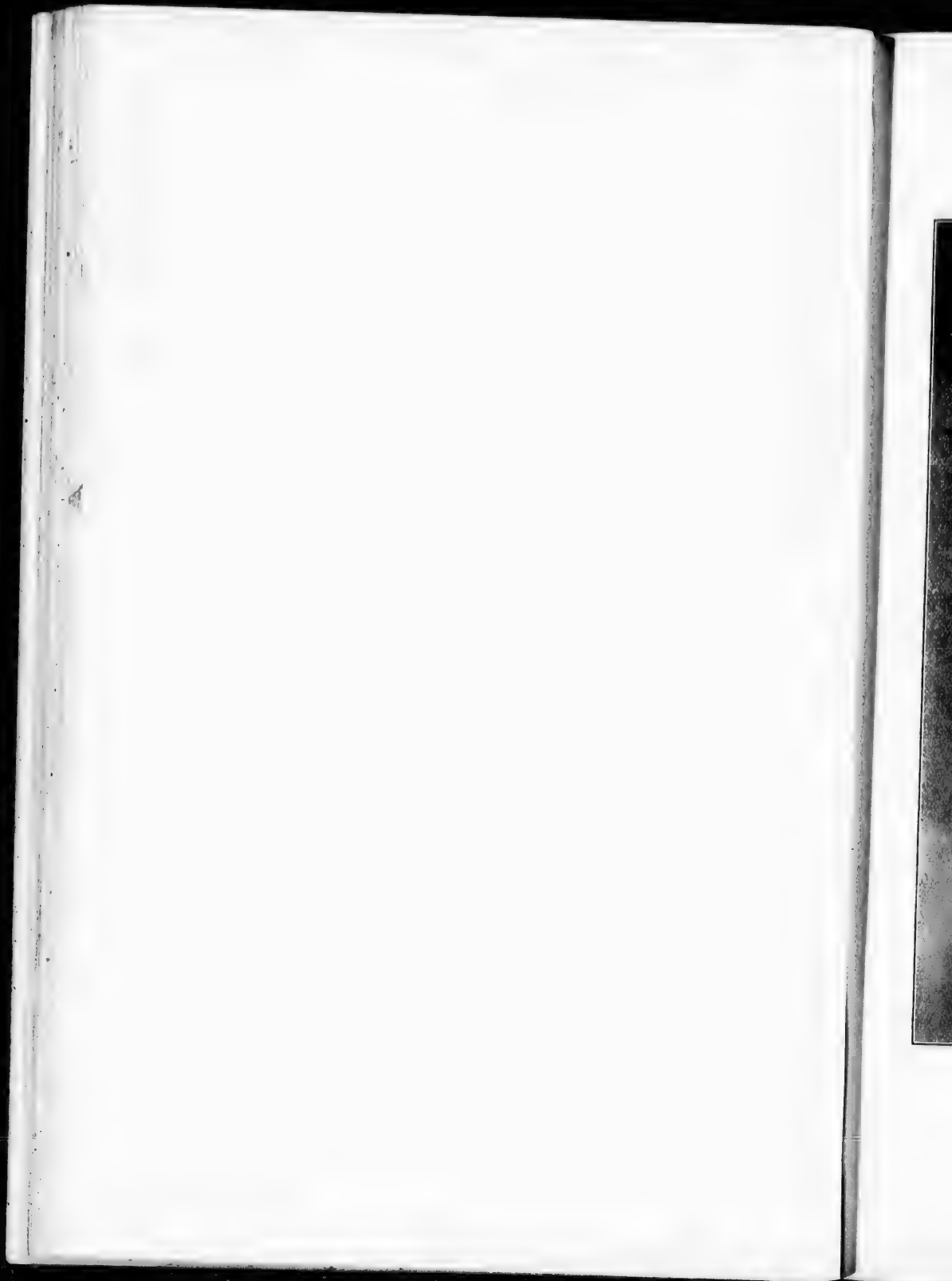


LOOKING EAST (JULY 9),



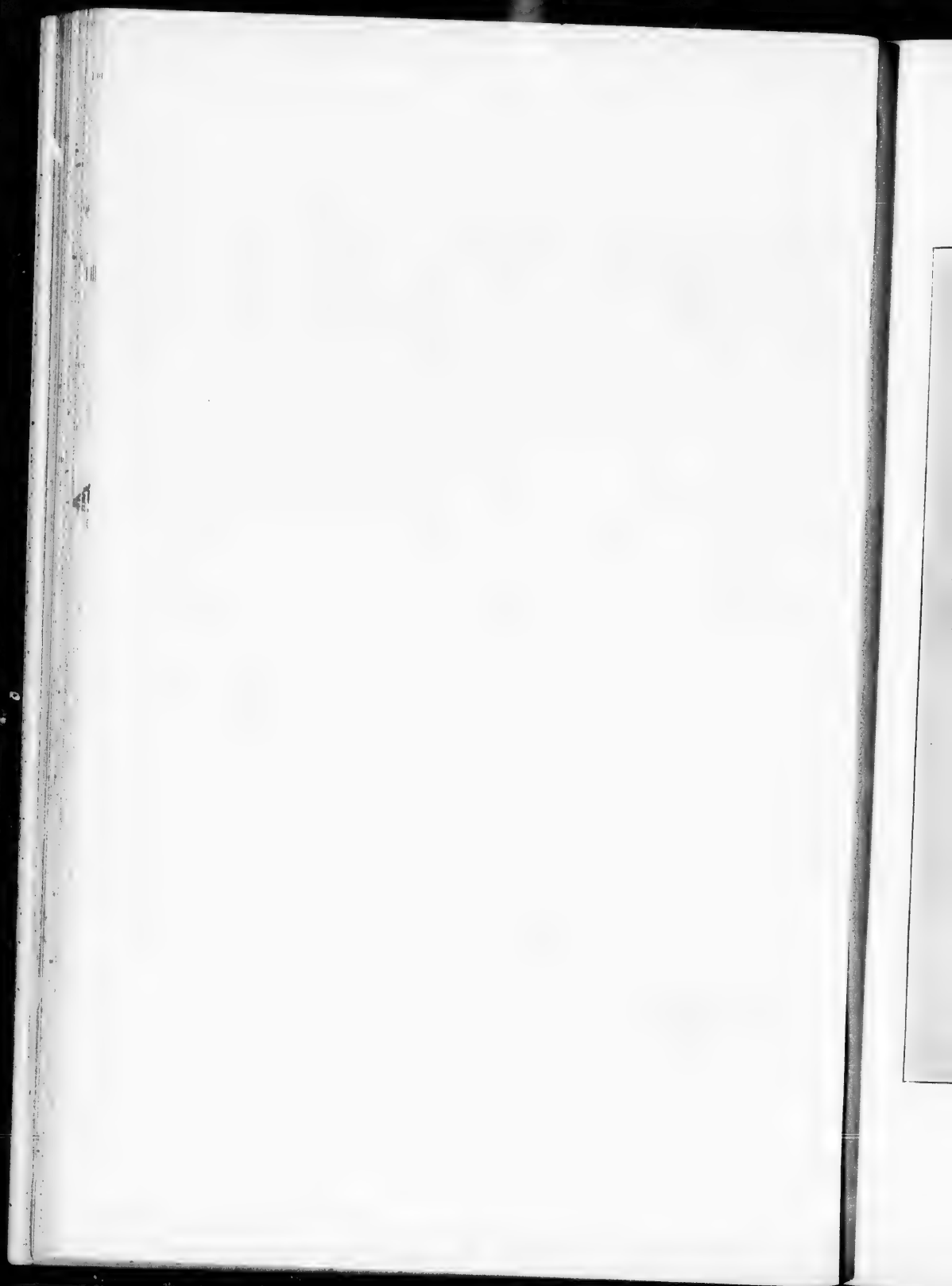


LOOKING SOUTH (JULY 15).





LOOKING NORTH-WEST TOWARDS SALISBURY ISLAND (JULY 15).





FIELD ICE LOOKING NORTH EAST TWENTY MILES OFF SOUTH SHORE (JULY 18).

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Island into the open water of the Hudson Bay; some heavy ice about, but this is scattered and we can steam our course full speed. At 8.10 p.m. fog settled down very thick and, as there was some scattered heavy ice about, stopped ship to wait for clearer weather.

Tuesday, 13th July.—Thick all night. Fog lifted at 4 a.m.; went ahead at once. We had made little or no drift during the night. Cape Digges bore about as it did last night when the fog shut down. Light southerly wind and hazy weather; we are taking a round down into the bay, between Mansfield Island and the Labrador shore, to see what the ice is like; we find light open ice much scattered through which we make full speed with no difficulty. The ice is very open and any vessel could safely steam through it with clear weather; here and there there is a heavy pan which has to be avoided. At 10 a.m. changed our course to bear up for the north of Mansfield Island with a view of looking into the straits between Mansfield and Southampton Island. We have so far seen no ice such as that described by Captain Gordon, on page 193 of his report for 1884, as being met with between Salisbury and Nottingham Island and the Digges and further described on page 197 the same year, as having been seen from the top of a hill on Nottingham Island, etc. Found the strait between Mansfield Island and Southampton Island, as far as we went, to contain a good deal of loose much water-soaked ice all driving to the north with a strong southerly wind which is blowing. This ice is mostly thin, very little rafted, and would present no great obstacle to navigation. An ordinary steamer could safely go through most of it and it is so much scattered that a course can be kept through it quite easily. At 2 p.m. put about to pass outwards between Digges and Nottingham Islands and go on to the north coast at King George Cape to land Dr. Bell. Met no ice of any consequence; steamed full speed on our course, having only to swerve occasionally to avoid what looked like too heavy a lump. Wind freshened steadily during the afternoon; weather hazy; could not see very far. Sighted the Digges Island at 8.30 p.m. At this time was blowing half a gale; decided to stand in under the high land of Digges for shelter. At 10 p.m. made fast under the lee of a pan close inshore and kept our engine going slow ahead to hold our position under the island. Light open ice is going past us outside to the north-east at a great rate. Surface water in the bay to-day was 34.5°; thermometer in shelter on the deck was 45°.

Wednesday, 14th July.—Blew hard until 5 a.m. Cast off from our pan and shaped a course to pass south and east of Nottingham and Salisbury Islands, our intention being to cross to the north shore to land Dr. Bell at or about King Charles Cape; weather getting thicker all morning. At 1 p.m. too thick to run any longer; could see nothing of Nottingham or Salisbury Islands. We steered, since leaving Digges this morning, a regular course, having only now and then to yaw to avoid the larger pans. The ice we did meet was in belts, quite narrow, with good wide lanes of open water. It was thin, water-soaked and wasted, and was undoubtedly from the bay, and any vessel could have steamed as safely through it as we did; it has wasted greatly during the last four days. A great deal of the ice we have seen to-day is discoloured and soiled; on some of it we noticed sand and gravel; the most of it, however, is covered with an alga, similar to that we have already seen on the ice through the strait. Crew are engaged to-day, as yesterday, moving coals from the hold into the bunkers. 8 p.m.—Still thick fog; made the ship fast to a large pan. Our drift seems to be in a south-easterly direction. Had fine rain, with a light air from the north-east. At 8.30 p.m. sounded in 115 fathoms; rock, 29° at bottom. At 9 p.m. fog lifted a little; we can make out Salisbury Island. Cast off from the pan, and began steaming in the direction of the island to make the shore, but the fog closed down again almost at once. Stopped the ship and made fast to another pan. The current is now, at 9.30 p.m., setting to the east at the rate of about five knots and the ice is closing in all directions and grinding together; the heavier pans are driving through or over the lighter ones. We are keeping on the southern edge of the ice.

Thursday, 15th July.—At 1 a.m. the ice packed heavily about us. Had to steam to the south-west a short distance to avoid a nip. The ice now passing out from the channel between Salisbury and the north shore is heavy old ice. At 4 a.m. fog

lifted, and the weather became clear. Saw Salisbury Island about 10 miles off on the port bow. There is ice to the northward ahead as far as can be seen, a compact mass of heavy old ice with some enormous pans. This is by far the heaviest ice we have seen in the strait; it is streaming to the south-east, passing at the rate of fully five knots. Steamed along the southern edge of this pack close up to the eastern end of Salisbury Island. At 7 a.m. called Dr. Bell and explained the conditions to him; it is useless to think of our attempting to force a way through this ice across Fox Channel to King Charles Cape, if we enter it we may be jammed in it for days. Ice is also setting through the pass between Nottingham and Salisbury Islands. At 7.30 a.m. gave up all idea of entering the pack and put about for Charles Island to land Mr. Low. We had not made more than a mile after we had put the ship about before the ice surrounded us on all sides and we were beset. We could see a lane of open water to the southward and we decided to make for it by boring our way through. From 7.45 to 11 a.m. we were battering away at the pans, trying to force a way through. For the last three hours, in spite of backing and ramming we did not make 100 yards and at 11 a.m. without any warning the ice began to spin and circle in all directions and in five minutes we were jammed fast and pretty well nipped again. One large pan passed under the after part of the ship, jammed the rudder and screw and lifted our stern three or four feet out of the water; remained in this condition until 1 p.m., when without warning and just as quickly as it had come together the ice ran abroad again and began to come up from under the ship and she was again waterborne; at 1.30 p.m. we were steaming ahead full speed in comparatively open water following the south-west edge of the ice in the direction of Charles Island. The ice we met with to-day was undoubtedly Fox Bay ice coming down; it was old and heavy and much soiled, mostly in large pans, there was no small or thin ice among it, no bergs and no growlers, it was rafted and the pans were covered with pinnacles of ice, it must have been of several years' growth. We had no opportunity of measuring its thickness, but, as far as we could judge, much of it must have been fully forty feet in depth. In working out of the ice to-day the "Diana" behaved admirably, whether by splitting pans by ramming at them, or in dodging in or out among them; we all remarked her extreme handiness which enabled her to twist her way among the pans in a manner which a longer or less handy ship could not have done. An ordinary ship would have been in grave danger in this pack, as it was extremely heavy, grinding, shoving and swinging in all directions; we gradually got into more open water. To the north the ice is packed as far as we can see, and from Cape Digges along the south shore towards Charles Island there is a narrow belt of ice; had the eastern end of Charles Island abeam at midnight.

Friday, 16th July.—At 4 a.m. we are abreast of the entrance to King George's Sound seeing no ice inside; decided to put Mr. Low off here. Going slow by the lead with a boat ahead also sounding; when well into the sound met three Esquimaux in kayacks coming out to us. These men indicated the best anchorage. We anchored under the western land at 8 a.m., in fifteen fathoms and began at once to get ready to hoist Mr. Low's yacht out; did this safely by 4 p.m. Some ice had been running, and we found our anchorage unsafe, in fact, we had to shift it twice to avoid ice, sent a boat with second officer to examine further up the sound for a harbour, he returned at 4 p.m., and reported good safe shelter a few miles further in; he found a good passage in, least water five fathoms at low tide. Got under way and steamed round to the harbour which I called *Douglas Harbour*. Found here a splendid safe harbour with ample water close inshore, a smooth beach on one side with high rocks on the other, mud bottom. Anchored close inshore in ten fathoms at 5 p.m. We found here three families of natives hunting white whales, seals and walrus; they have ample food and are rolling in fat and grease. The engineer reports the condenser leaking; decided to allow him to make the necessary repairs at once.

Saturday, 17th July.—Engaged hoisting out Mr. Low's supplies, and stowing our own in the lower hold to stiffen the ship so as to avoid taking in rock ballast. Engineer will have steam again to-night. Went up to the head of the N.W. arm during the afternoon; found a small river emptying into the head of the arm, the Esquimaux told us

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that large trout could be found in it; saw a large number of trout, but they would neither take a fly nor the bait; they appear to be ordinary sea-trout.

Sunday, 18th July.—Mr. Low left us at 9.40 a.m., and we sailed at once for Ashe Inlet to land Dr. Bell. We found open water for about ten miles off the southern shore. We entered the ice at 1.30 p.m., shaping our course for Big Island, found the ice light, much worn and open. We steamed through about 25 miles of it, most of the time going full speed, avoiding the heavier pans and rafted lumps by swinging round them and going straight through the lighter ice. Made Big Island about 7 p.m., but, as it was hazy over the land, we made fast to a large pan to wait for daylight or rather morning. Any suitably protected steamer that could manœuvre easily could have gone through the ice we met to-day as easily as we did; a more powerful ship could have made better time in the light brashy ice, but among the larger pans the "Diana" could do better, owing to her ability to turn quickly. There was a belt of light open ice up and down the strait with open water for about ten miles to the shore on each side. We saw one small berg to the northward as we were crossing; we believe it to be the same, in a somewhat reduced condition, that we had left behind off Saddle Island on the 23rd of June.

Monday, 19th July.—At 2.30 a.m. stood in for the land; made the beacon at 3 a.m., and at 4 a.m. we were off the entrance to Ashe Inlet; we had gone through about ten miles of open water. Found the inlet full of ice, which has evidently just broken up with the recent high tides and is now coming out before the northerly wind. The shore ice (collar ice) is still attached to the rocks all around; no hope of putting over Dr. Bell's yacht now. Backed off and decided to wait and see what the falling tide and the wind would do. Stood off shore a couple of miles. At 9 a.m. ran back to the inlet and found the ice mostly gone; stood in and anchored off the house. At 9.45 a.m. still some loose ice floating about. At once prepared to hoist out Dr. Bell's yacht. At 6 p.m. this was done, the ballast on board, and the yacht rigged. Weather looking bad, barometer falling. At 7.30 p.m., blowing half a gale from S.S.E. and the ice coming rapidly back into the inlet which is open to this wind. Cast off the yacht and instructed her captain to run up into a cove at the head of the inlet; stood by with steam up ready to help the ship if the entering ice forced us too much; raining heavily at intervals; tide will be high a little before midnight when the ice should slack. We have yet to get the supplies on board the yacht. The house here seems to be very much as it was left, the flagstaff is standing and the pipe projecting through the roof; odds and ends such as paper, etc., are lying about just as they were left; by a notice on the wall it appears that Lieut. Peary and a party of five had called here in the "Eope" last season.

Tuesday, 20th July.—Strong breeze of south south-east brought in the ice with the rising tide; had to keep the engine going to steer the ship and relieve the anchor until 3 a.m. when with the falling tide and the wind which had come round to the north north-west the ice went out. At 7.45 a.m. the yacht returned and, her stores being on board, at 11.15 a.m. Dr. Bell cast off. We left the harbour at 1.30 p.m. for the eastern entrance of the strait; when clear of the inlet and the ice which had been driven out of it since the wind changed we found ourselves in open water; set all square sails and the log and stood out of the strait in the direction of the Button Islands. Fresh north-west wind, ship making ten knots under sails and steam. Passed during the afternoon and evening six small bergs or pieces of bergs; no field ice visible on either hand.

Wednesday, 21st July.—Had a fine night and good run; saw no ice. At 9.15 a.m. made the Button Islands ahead; there is ice in Ungava Bay, and a narrow belt of ice extends along the Cape Chudleigh shore and for about ten miles to the eastward of the Button Islands; it is much worn and broken up and is swinging before the wind round the Buttons. The wind is hauling more to the west and is driving the ice out of Ungava Bay round the Cape Chudleigh shore. To the north and east and in the direction of Resolution Island and out of the strait to sea we can see no ice. There is a haze over the land which prevents us seeing more than the loom of Resolution Island. At 11 a.m. the Buttons being abeam about ten miles off and seeing no ice whatever

ahead, put the ship about, and stood back up the strait. As far as we can see there is nothing to prevent any vessel from steaming into the strait and, save the ice in Ungava Bay, there is no ice between us and Big Island, and when we left Big Island we could see no ice to the south or west.

I think it now of importance for us to find out what has become of the Fox Channel ice at the north-western end of the strait, that which we were in on Thursday last. Since we got clear of this on the 15th we have seen no ice to impede any ship; in fact, we have been in open water all the time, save on Sunday the 18th, when we were crossing from King George's Sound to Ashe Inlet when we steamed through about twenty-five miles of light open ice. We had a strong breeze from the west north-west against us and a heavy lop while we were steaming back up the strait this afternoon.

Thursday, 22nd July.—Had strong head wind all night with considerable sea, no field ice; saw a few bergs, the same most likely that we have seen on our way east; wind moderated to a light breeze during the morning, and the water got smoother. At 7 a.m. sighted field ice to the south and coasted along the north-eastern margin of it. All morning our course has been north by west. At 1.30 p.m. sighted ice ahead, that which we have had on our port hand all morning is light broken ice with much open water through it and it connects with the ice ahead, extending away towards the north in the direction of the western end of Big Island, the high land of which we see to the north north-east. Our course is up mid-channel; entered the ice at 2.15 p.m. This is unquestionably the Fox Channel ice coming down, it has greatly changed since we lost sight of it a week ago, it has run abroad greatly, and shows the effects of the week's fine weather and the rise in temperature. At 3 p.m. tied up to a large pan to take in fresh water; at 5 p.m., all tanks, boilers, etc., being full, we proceeded full speed; we saw some large heavy pans. Proceeded steadily ahead until 10.30 p.m. when we met heavy close packed ice and decided to lay by for daylight; it was light but we could not see far enough ahead to know exactly in which direction to work. We were well off shore and abreast of the Maiden's Paps.

Friday, 23rd July.—Proceeded at 1.30 a.m.; found the ice more open. Off the entrance to Douglas Harbour at 2.10 a.m., ice slightly heavier and in some places more closely packed. Sighted Charles Island at 6 a.m. Had some good leads from 6 to 8 a.m. At 9.30 a.m. bored our way through a heavy bar of close packed ice and emerged into clear open water; ice to the northward of Charles Island appears to be much scattered. It would not have been possible for an ordinary freight steamer to have pounded her way through the ice, which we have met since yesterday evening as quickly as we have; we have driven the "Diana" straight through, that which would have brought an ordinary vessel to grief at once. There was no disposition to run together or nip, and any vessel could have laid by safely in it while through most of it the way was fairly open. At 11.45 a.m. found a lane of open water along the north shore of Charles Island from which the ice extended to the northward outside of us, this was all Fox Channel ice. Some of the pans were of great extent, being several miles in circumference, and, standing as high out of water as they did, from five to ten feet, they must have been of great thickness. This ice was continuous with that we have had between us and the north shore all the way from Prince of Wales Sound. Got round the western end of Charles Island at 2 p.m. and shaped our course for Cape Digges in open water. Had Cape Digges abeam at midnight. The ice to the north extends away in the direction of Salisbury Island.

Saturday, 24th July.—Rounded Cape Digges shortly after midnight and slowed down; found a strong current setting round Cape Digges and down the strait. At 4 a.m. proceeded slowly round to the south of Digges Island; at 4.30 a.m. ran into Port Laperrière and anchored. Began at once to shift coal from the forehold to the bunkers; at 5 p.m. having moved about forty tons, washed down. Eight Esquimaux in kyacks came off from the mainland to join us here. These people are over on the mainland hunting deer; they brought no meat with them but they had a number of fresh skins; they appear to be more like Mountaineer Indians than genuine Esquimaux, and they

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are dressed like Indians in clothing supplied by the Hudson's Bay stores; felt hats, blankets, shirts, jerseys and moleskin pants, these garments they wear either over or under their ordinary sealskin clothing. Had a fine warm day; mosquitoes very troublesome.

Sunday, 25th July.—Left Port Laperrière at 9 a.m., which was as soon as we got rid of our Esquimaux guests; stood out round the Digges Island, and by the eastern end of Nottingham up towards the east end of Salisbury Island. A stream of heavy old ice is still passing out north of Salisbury and on down the strait, from Cape Digges to the eastern end of Salisbury Island we had open water. The passage between Nottingham and Salisbury Island is full of ice; steamed up to the edge of the ice but did not enter it. It seems to have wasted a good deal since we were off here on the 14th and 15th instant, just ten days ago. Stood to the south south-east along the edge of the ice, a wing of which extends westward to the mainland east of Cape Westenholme, passed through it in the bight, where it was narrowest and most open. This ice was greatly worn and much discoloured with the same kind of algae which we have before noticed. We were in open water again at 6.50 p.m., and proceeded south south-east at full speed. The main body of ice is still to the north and east of us, but it seems more scattered and open. The day has been fine and warm; in going out of the strait this time I will try and keep in mid-channel; followed along the edge of the ice, heading more to the east; at 10 p.m. slowed down and proceeded easy.

Monday, 26th July.—At 1 a.m. still following the southern margin of the ice, which is now close packed and solid. At 1.30 found the ice heading slightly to the west of south. Followed it along, passing at 5 a.m. between the east end of Charles Island and the main body of the ice. The ice here extends to the south shore, where we had open water going west on Friday last. Followed along the mainland shore for about an hour when at 7 a.m., the ice seeming in that direction to be slack, stood away for the north shore in the direction of Emma Island. Found the ice fairly open in crossing and we were generally able to go half speed through it. Passed many large, heavy pans, but most of the ice was much worn. Towards the north shore at 1 p.m. found the ice more gone abroad than on the south shore; edged off in the direction of Big Island. At 4.30 p.m., being about fifteen miles off Big Island and a little to the west of Ashe Inlet, ran out of the ice into open water. At 5 p.m. we were abreast of the Beacon; set log and shaped course for the Buttons; set canvas; no ice in sight ahead, either to the east or the south.

Tuesday, 27th July.—At 8 a.m. had steamed 125 miles by log on a southerly course; then headed the ship south-west to look for Green Island. At 11 a.m. made land ahead where Green Island should be, but at 1 p.m., in lat 50°67', we were stopped by the ice in Ungava Bay, about ten miles from the island. Captain Gordon passed twice where this island was supposed to be, in clear weather, and saw nothing of it, and had authorized its removal from the chart. The ice has prevented us from getting in nearer this time, but at present we are all inclined to the opinion that the island exists. There was so much loam that we could not distinctly distinguish the shape of the island we saw and it may be that this is only the northern end of Akpatok Island, which is supposed to be twenty-five miles further up the bay than Green Island. When we go later in the season to Ungava to pick up Mr. Low we will finally decide this matter. At 1.30 p.m. shaped our course for Port Burwell. We had gradually to haul more to the north-east to keep clear of the ice, a belt of which extends all along the eastern shore of Ungava Bay and out past the Buttons. Kept along the edge of this ice all afternoon and evening until 8.45 p.m. when tied up to a pan to wait for morning; we are about 12 miles off Port Burwell and separated from it by a heavy belt of ice which is packed along that shore and setting out of Ungava Bay round the Buttons and Cape Chudleigh. We saw several good sized bergs in the bay and some growlers among the ice; we have seen nothing of the kind among the ice up the strait; this makes us conclude that some of the ice in Ungava Bay is undoubtedly Baffin's Bay ice, which has been set across the mouth of the strait and into the bay with the easterly and north-east winds, this ice is now going out before the westerly winds and will be carried round the Buttons past Cape Chudleigh and down the Labrador.

Wednesday, 28th July.—Cast off from the pan at 2 a.m.; we have now about twelve miles of compact ice between the ship and Port Burwell; did not attempt to force our way in, we made but little drift during the night; stood out round the Buttons, keeping about ten miles off the islands, at this distance there was little or no ice but beyond to the north-east and south, there was considerable field ice, scattered and open round the edges, but more closely packed in the interior. We stood on out through this to the eastward, finding lanes of open water here and there, at right angles to our course; the ice in these belts is heavy and the pans large; all the ice, however, is worn and rounded at the corners, it is in motion, whirling and circling with the current; at 9.45 a.m. reached open water with no ice to the north-east and east, as far as can be seen; the ocean swell can be felt, though the day is calm; to the south-east and south between us and Cape Chudleigh there is open ice, with a few bergs; towards the shore of Labrador the ice appears to be more open than it is fifteen or twenty miles off; at 10 a.m. put the ship about and stood west to make the land near Cape Chudleigh with the idea of going into Sir Terence O'Brien's Harbour. This harbour is used by fishermen and is said to be safe and good in all weather; worked through belts of heavy close ice with lanes of open water or looser ice between. From the appearance of the ice in the entrance to the strait and outside of it, I should say that it is from Baffin's Bay; from the Labrador shore the ice extends seawards as far as can be seen; we find the coast line entirely wrong as laid down in the last chart; the older charts being more nearly correct; the recent chart shows no islands near Cape Chudleigh, while there are two large islands with a deep passage between them and the mainland through which we passed to reach Sir Terence O'Brien's harbour, where we anchored in nine fathoms at 5 p.m.; sent at once a crew to fish for cod, found none; fishermen never expect to find cod here much before the 10th of August, all we got in our seine was a sculpin and two young cod fish. The harbour of Sir Terence O'Brien is simply a round hole in the hills behind the island of Cape Chudleigh, it is land-locked, has twelve and thirteen fathoms all the way in through a narrow pass, with 9 fathoms in the anchorage, the only trouble is that the place is very squally, the cliffs rising abruptly all round from 1,000 to 1,500 feet, the squalls come down from them with terrible force, the holding ground is however good.

Thursday, 29th July.—Crew engaged re-stowing stores preparatory to taking on board coal at Nachvak; took on board some rocks for ballast so as to trim the ship more by the stern, found our screw too high in the water yesterday to be safe in ice; strong south-west wind, overcast and cloudy.

Friday, 30th July.—Left at 2 a.m. and proceeded out of the eastern pass behind Cape Chudleigh, light scattered ice outside and several bergs; stood off shore about fifteen miles and shaped our course down the coast to bring us off Nachvak; where we hope to meet our coal vessel on the 1st August; at 6 a.m. open water, no ice in sight; at 9.30 a.m. came down thick, had to slow down; 9.50 fog lifted, again proceeded full speed, smooth water with a light air from the east; we saw no ice, but there is a distinct ice blink to the eastward, and we know from what we saw on Wednesday that there is a considerable body of ice in that direction. This ice has been blown off shore by the strong breeze of yesterday; 10.10 a.m. fog came on again; slowed down at 4.30 p.m., stopped the engines; sounded in eighty-two fathoms, hard bottom, light south-east wind; at 8 p.m. still thick, wind hauling to south south-west; sea calm; tried for cod several times to-day with no success.

Saturday, 31st July.—Had it thick all night. Stood in towards the shore slowly, sounding at intervals in 90, 95 and 85 fathoms; at 3 p.m. made out the tops of the peaks over the fog, but could not make out the marks for entering Nachvak, and after steaming along the land for some time had to stand off shore for the night, which we did at 9 p.m.; allowed the ship to drift.

Sunday, 1st August.—At 2.30 a.m. the weather cleared; stood in for the land; made the White Handkerchief and Mount Razor Back and ran into the mouth of Nachvak Bay; saw no vessel at any of the anchorages at the mouth of the lower bay; continued on up to the Hudson's Bay post and anchored at 8 a.m. Mr. Ford, the agent,

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came on board. The "Eric" had left here last Sunday for Churchill; no fish here yet. The spring had been an early one, the westerly winds keeping the field ice off shore; the bay ice only went out in the beginning of July. We could not possibly have got in when we first went up the coast, as the bay was still frozen over. Nets are being set out for trout which are now coming back from sea. These fish come down the rivers in June, before the ice breaks up. Cod usually reach here about the 6th of August and remain until the end of October. At 4.30 p.m., weather being squally, changed our anchorage to further out in 21 fathoms and let go both anchors.

Monday, 2nd August.—Crew engaged trimming ship by the head during the morning, and in the afternoon unshipped our broken rudder and shipped the spare one; tried for fish with seine, took a few small trout and some sculpin.

Tuesday, 3rd August.—Engineer blew off his boiler and is engaged refitting and cleaning generally; tried again for fish but with no success; sent steam launch down the bay to see if the coal ship had arrived below, but they returned having seen nothing of her; the day was showery with squalls.

Wednesday, 4th August.—Refilled boilers with fresh water; sent steam launch down to the mouth of the bay to look again for coal ship; it is 15 miles from the mouth of the bay to our anchorage; they tried for fish at the mouth of the bay but found none.

Thursday, 5th August.—Engineer began raising steam in the boiler; crew engaged painting the hull of the vessel.

Friday, 6th August.—At 8.30 a.m. sighted a sail coming up the bay; she proved to be the "Maggie" with our coal; got her alongside at 2 p.m. and at once began taking coal; she had left Sydney, Sunday, 15th July, and has been off the bay since Monday last; but could not get in owing to calm and fog; we received our mail by the "Maggie."

Saturday, 7th August.—Crew at work all day taking in coal, had 120 tons in by night. Fog and rain with strong east wind. First cod fish taken to-day a few miles below our anchorage.

Sunday, 8th August.—Rain, fog and changeable winds.

Monday, 9th August.—Rain and snow, the tops of the hills being everywhere covered; wind changed to the north north-west; all hands engaged at the coal.

Tuesday, 10th August.—Fog and strong south-east wind. Crew engaged helping the "Maggie" to take in ballast.

Wednesday, 11th August.—Taking out the balance of the coal. Fog in the morning and strong east wind.

Thursday, 12th August.—Finished coaling. Crew engaged taking in fresh water and cleaning up generally.

Friday, 13th August.—Began getting in the anchors at 3 a.m. Left Nachvak at 7.10 a.m. Set log off the mouth of the bay 10.40 a.m., and shaped a course for Cape Mercy on the north side of Cumberland Bay. Southerly wind with considerable swell, no ice.

Saturday, 14th August.—Wind changed to the north at 3.45 a.m., and came down thick, slowed down, variable weather all day with fog at intervals. Weather clear at 6 p.m., when made the North Foreland, Monumental and Lady Franklin Islands, a few bergs in sight, but no field ice.

Sunday, 15th August.—7 a.m. made Cape Mercy and stood in for Cumberland Sound and up along the north-eastern shore; had fog at intervals all morning, saw a good many icebergs and a little drift ice, Milikduak Island abeam at 3 p.m., stood on, past it and the Middle Islands, to Kekerton Harbour which we entered with boat ahead sounding, anchored off the whaling station at 7.45 p.m. Mr. Milne the resident officer in charge came on board, Mr. Mutch, the regular agent had gone home to Aberdeen last fall and had not yet returned. The brig "Alert" which serves this station is hourly expected from Peterhead.

Monday, 16th August.—Landed and inspected the station and obtained all the information we could as to the history of whaling, its methods and customs, from Mr. Milne. Fog and rain all day. About 140 Esquimaux, men, women and children, are here employed and maintained by Mr. Noble, who at present controls the whaling stations in Cumberland Sound.

Tuesday, 17th August.—Landed and hoisted the Union Jack in presence of the agent, a number of our own officers and crew, and the Esquimaux, formally declaring in their presence that the flag was hoisted as an evidence that Baffin's Land with all the territories, islands and dependencies adjacent to it were now, as they always had been since their first discovery and occupation, under the exclusive sovereignty of Great Britain. Fog all day.

Wednesday, 18th August.—Thick all morning and up to 2 p.m., clearing at that hour; got in anchor and left at 2.30 for Black Lead whaling station on the west side of the sound; met no ice in crossing. Anchored under Black Lead Island at 8 p.m., landed and found here Mr. Sheridan, agent of the Messrs. Noble of Aberdeen, in charge of the station, and the Rev. Mr. Sampson, an English missionary sent out to the Esquimaux of Cumberland Sound. There are here about 140 natives, men, women and children, in the employ of Mr. Noble. To this population there has within the last few days been added 120 men, women and children who have arrived here from New Gummite, where a whaling station owned by the Williams Company, of New London, Connecticut, had formerly existed; this station having been abandoned, the natives have come up here to seek for employment.

Thursday, 19th August.—Strong south-west wind and rain; landed and spent the morning on shore. The natives, here, as at Kekerton, are well off and live in larger and more comfortable teepees than those seen anywhere else, they are engaged to Mr. Noble and are supplied with rations by him, they are engaged under the same conditions as those at Kekerton. A large part of the population is absent just now in the interior of Baffin's Land, deer-hunting, the object of the hunters is to obtain deer skins for winter clothing. Tried off here to-day for fish, the natives tell us that both cod and halibut are occasionally found, but we got none, they tell us that small halibut are frequently found frozen in the ice. Salmon and trout are found in all the streams and in all the lakes at the head of the streams. Weather clearing at 5 p.m. left Black Lead for Hudson Strait, rounded Point Imukanakajuing at 9 p.m., and shaped a course to pass outside of Lady Franklin Island, saw a good many bergs off the south of the sound.

Friday, 20th August.—Sighted Lady Franklin Island at 10 a.m. and stood on for Resolution Island, rain and fog at intervals all day; passed a few bergs, none of them of any great size.

Saturday, 21st August.—Getting too thick to run, stopped the ship at 12.15 a.m. clearing again at 3 a.m., started ahead full speed, but it shortly afterwards came down as thick as ever, and we had to stop the ship; at 5.30 a.m., fog lifted, proceeded ahead, made Resolution Island at 7.30 a.m. and hauled ship up to pass westward of the Buttons. Buttons abeam at noon; ran into Port Burwell and anchored at 2.30 p.m. Found the steamship "Nimrod" in Munroe Harbour fishing, she had been here for a week; took her first fish yesterday, to-day they are taking cod abundantly; she has come here from Blanc Sablon and reports good fishing in that neighbourhood. Crew engaged taking in water. Blowing hard from the north-east. Left Port Burwell at 7.15 p.m. for Hudson Bay, found outside a heavy cross sea. Wind freshened to a gale and at 11.30 p.m. had to put the ship's head to the wind, and slow down, as our decks were being washed.

Sunday, 22nd August.—Wind moderating at 3.30 a.m., came back to our course, still considerable sea on, the tide rips were very heavy the water simply boiling on all sides. By noon the weather had moderated and the sea fallen; wind towards evening came round to the north-west with considerable swell.

Monday, 23rd August.—Fine clear day with moderate north-west wind and smooth water. Big Island abeam at 5 a.m. Shaped a course for Salisbury Island. At 3 p.m.

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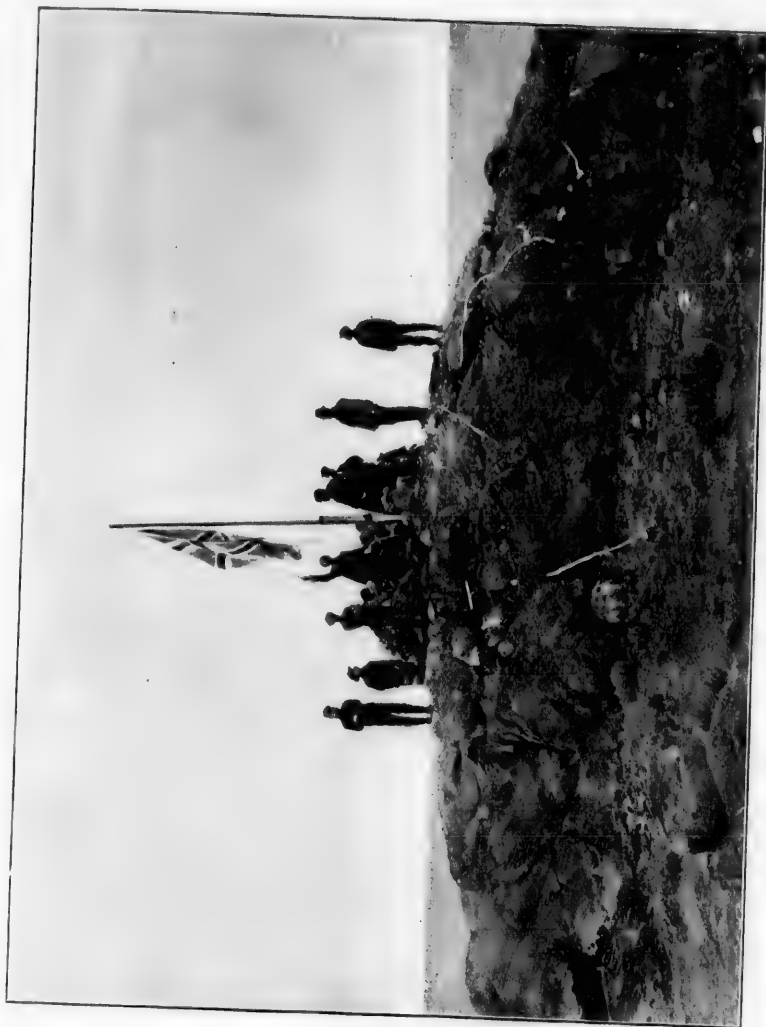
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came down thick. Proceeded slow, sounding at intervals, getting 90 and 85 fathoms showing that we were on the bank north of Charles Island; 10 p.m. weather cleared up, proceeded ahead full speed.

Tuesday, 24th August.—At 6 a.m. sighted the eastern end of Salisbury Island. Hauled to the north to make King Charles Cape and if possible have a look into Fox Channel. At 9.15 a.m. came up with a wall of ice reaching from the end of Salisbury Island in a north-easterly direction as far as we can see, the outer border of this ice is loose and worn, but further in it looks compact and solid. Make no attempt to enter the ice but shaped our course to pass round Nottingham Island and down between Coates' and Mansfield Islands. Fresh north-west breeze and cold weather; towards sunset the weather became overcast and cloudy, passed about ten miles off the north-east end of Mansfield Island, but it was too dark and cloudy to make the land.

Wednesday, 25th August.—Sighted the land, Coates' Island, at 2 p.m. in the neighbourhood of Carey Swan's Nest. Shaped our course for Churchill. Wind freshened during the evening to half a gale from the north-west, with a short breaking sea. Crew had been engaged all day passing coal from the forehold to the bunkers.

Thursday, 26th August.—Had a dirty night, towards noon the weather moderated and the wind hauled more to the south. Fore and aft canvas on the ship at 2 p.m.; we have only averaged $4\frac{1}{2}$ knots since the same hour yesterday.

Friday, 27th August.—Wind round to the north-west, with haze and fog at intervals. Sounded in 28, 35, 40 and 42 fathoms. Our distance being fully run at 7 p.m., stopped the ship and laid to for the night.

Saturday, 28th August.—Lead going every hour in from forty to thirty-eight fathoms during the night. Stood in at 5 a.m., shoaling our water gradually to nine fathoms, when at 9.10 a.m. let go the anchor until the fog lifted, so that we could make out the land and distinguish the beacons. Both yesterday and to-day we have tried for fish, but took nothing. Light north north-west wind, with rain and fog.

Sunday, 29th August.—Fog and rain; glass falling and appearance of bad weather; at 4 p.m. clearing a little. Got under way, and proceeded slowly by the lead to feel for the channel of the river, gradually deepening our water to twenty fathoms. We bore up to the south along the edge of the twenty-fathom line, at 5.30 p.m. made the beacon on Esquimaux Point and ran into the harbour and anchored.

Monday, 30th August.—At 12.30 a.m. a very strong current running out, causing the ship to swing about. She took the ground by the stern with the falling water, and remained fast until 4.30 a.m., when with the first of the flood she floated off. Shifted our anchorage a little further from the bank. At 7 a.m. towed up to the post about three miles from the anchorage. Found Captain Hawse, the agent in charge, at home. The "Eric" had left ten days ago for Ungava. Returned on board again at 1.10 p.m. It is blowing half a gale from the eastward, with rain and fog. Crew engaged moving coal from forehold to bunkers.

Tuesday, 31st August.—Gale continues, with rain. Went up to the post at 7.15 a.m., and returned on board at noon. Crew engaged bringing on board fresh water; as the tide runs here about six knots the boats can only be worked during the slack. At 3.30 p.m. let go the second anchor; heavy sea outside breaking all around the entrance to the harbour.

Wednesday, 1st September.—Weather moderating; crew engaged taking in fresh water. Captain Hawse, who came on board to-day, informs me he has sent his crew up the river for fresh fish and that they will be back early to-morrow so I decided to wait and secure specimens of the fish.

Thursday, 2nd September.—Rowed up to the post this morning and secured specimens of fish from Captain Hawse. His men had just returned from up the river with a quantity of fish, pike, suckers, whitefish and grayling; earlier in the season—in July and the beginning of August—they also get trout and salmon. The salmon are small,

only running about six pounds. Whitefish here are frequently taken in the salt water; we ourselves took some yesterday along the beach outside of the harbour. Captain Hawse informs me that he has often tried for fish in Hudson Bay when becalmed in his vessel, but that he had never yet caught anything. Returned on board at 11.30 a.m., got in anchors, and at noon left Churchill to cruise in the bay and try for fish. At 3.30 p.m. came to and set a trawl baited with clams and fresh fish. Got over the dredge on a bottom of clay small stones and gravel in thirty fathoms; had out also a surface tow net, but it yielded nothing. At 6 p.m. took in our trawl, with nothing on it. Temperature at the surface, 43°; at the bottom, 33°. Continued in the direction of Mansfield Island.

Friday, 3rd September.—Came to at 6 a.m., set trawls in eighty-three fathoms. Surface temperature 43°, bottom, 30°; mud, with a few small stones; specific gravity of the water at the surface 1023.4, at the bottom, 1025.8; coming on to blow hard and the sea making, had to take in our trawl at 10 a.m.; nothing on it, continued our course. By 2 p.m. it is blowing half a gale, with a short angry sea. Everything awash on deck, raining hard.

Saturday, 4th September.—At 4 a.m. same weather, laid the ship to, intending to wait for more favourable weather. Ninety fathoms; too rough at present to set a trawl or to dredge. Held on until 10 a.m. when the weather getting worse and wind hauling more to the eastward put the ship on her course, taking a good deal of water.

Sunday, 5th September.—Since 8.30 a.m. yesterday to the same hour to-day, we have only made sixty miles. The wind is back to the north and north north-east. No chance of doing any fishing. Rain all day yesterday and to-day.

Monday, 6th September.—Weather moderating a little. As I have to meet Dr. Bell at Ashe Inlet on the morning of the 10th, and I am afraid that the north to east wind which we have constantly had since the 28th August may have driven the Fox Channel ice down on Cape Digges and blocked the passage between Salisbury Island and Cape Digges, I am forced to keep on and give up any further trawling for fish. Made the south end of Mansfield Island at 1 p.m. At 4.30 p.m. we were fairly round the shoal off the south point and shaped a mid channel course for Cape Digges. Short breaking sea with rain and squalls. Sounded in sixty fathoms off the south shoal. Found bottom temperature of 40°, with surface temperature at 43° and a strong current setting to the north.

Tuesday, 7th September.—Snow squalls and strong north-west winds. At 12.10 a.m. made Cape Digges; at 2.30 a.m. stood round the cape and shaped a course to pass north of Charles Island. Saw no ice off Cape Digges, though there was a decided ice glint to the northward. We were up with the western end of Charles Island by 3 p.m. Had frequent snow squalls during the day. The hills are everywhere covered with new snow. Off the eastern end of Charles Island at 6 p.m., fresh north wind with snow squalls. At 7.30 p.m. laid the ship to under canvas to wait for daylight.

Wednesday, 8th September.—Had a good deal of snow during the night. No ice in sight anywhere. At 4.15 a.m. stood in and followed along the land to King George's Sound. Entered the Sound at 10 a.m. Set trawls in forty fathoms in centre of the sound. 35 degrees at the bottom, 35.8° at the surface; continued into Douglas Harbour and anchored at noon; crew at once began to move coal from the forehold to the bunkers; light snow flurries at intervals all day.

Thursday, 9th September.—Crew engaged taking in fresh water and shifting coal. Saw no Esquimaux here now; light north-east wind; large numbers of wild geese about the bay and feeding on the hills and fresh deer tracks on the beach. Left the anchorage at 4 p.m. for Ashe Inlet; outside in the sound overhauled and took up our trawls; found no fish. Proceeded for Ashe Inlet.

Friday, 10th September.—After midnight the weather began to get bad, the wind freshening from the south-east, made Big Island at 2 a.m. and laid by for daylight; sea making rapidly; at 4 a.m. stood in for the land to make the beacon on the north bluff.

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At 5 a.m. we are off the entrance to the inlet at Rabbit Island ; it is now blowing a gale and the sea is running directly into the inlet, we therefore could not risk going in to anchor, so stood off shore to wait for finer weather. The glass is falling steadily, and heavy snow squalls are constantly passing ; at 10 a.m. gale still freshening and heavy sea running with a regular snow storm ; put the ship about and ran before the wind for Douglas Harbour. At noon, too thick to make the land, took in top-sails and laid the ship to head to the sea under lower stay-sails and easy steam, heavy sea running. At 2.30 p.m. weather brightened, made out the land, stood in and made the islands off King George's Sound, ran into Douglas Harbour and anchored at 4 p.m. at 7.45 p.m. ; still heavy gale, let go the second anchor.

Saturday, 11th September.—Wind veering more to the north, still blowing hard with frequent snow squalls, at 5 p.m. wind back to the north north-west, glass has risen an inch since midnight, sun came out and the weather cleared. Got anchors in at 5.10 p.m. and left to return to Ashe Inlet for Dr. Bell. The hills about King George's Sound are now all covered with snow, ice made on deck to-day.

Sunday, 12th September.—Ran into Ashe Inlet at 5 a.m. and anchored. Found Dr. Bell and his party with the yacht here all well. They came alongside at once and began to unload into the ship. Dr. Bell desiring to have the yacht taken to Ungava Bay I agree to tow her there. Left Ashe Inlet at 11.30 a.m. We found a number of Esquimaux families here ; they report deer plenty on the island ; on leaving Ashe Inlet we shaped a course to look for Green Island, in Ungava Bay.

Monday, 13th September.—Had a fine night. At 2 a.m. sighted land in the direction where Green Island was laid down. Slowed, to wait for daylight. At 4.30 a.m. steamed in for the land which appeared large and high, we were close under it at 6.30 a.m. Steamed along the north-east and east sides of the island and at 10 a.m. saw five kyacks with Esquimaux hunters close in by the land. Stood in to hail them. Two of them came on board. They told us that the island is Akpatok, and that Green Island does not exist. Akpatok Island is therefore wrongly placed in the chart. Stood in to the land, sounding at intervals, and anchored close inshore in 15 fathoms. Sent Dr. Bell on shore as he wished to examine the rocks and collect specimens. 11 a.m. heavy squalls coming off the land ; held on here all day.

Tuesday, 14th September.—Thick fog during the night. At 11.15 a.m. clearing, got up anchor and shaped a course across for the head of Ungava Bay, intending to find an anchorage to pass the night under Saiglorsoak Island.

Wednesday, 15th September.—Saiglorsoak Island was not where we hoped to find it ; it does not exist as laid down in the chart. At 4 a.m. sighted several small islands ahead. Sounded in 140 fathoms ; later in 120, no bottom, and next in 13 fathoms. Stood on in by the lead for what we took to be the mouth of the river, going slow in from thirteen to seven fathoms until 1 p.m., when decided that we were near Whale River and not in Ungava ; stood back and round the islands further to the westward ; water shoal all the way. At 5 p.m. coming on to rain, and weather getting thick and dark, too much so to make out the land, anchored in ten fathoms. Saw numerous reefs and shoals inside of us.

Thursday, 16th September.—At 6 a.m. the tide having begun to rise, got under way stood along to the westward ; at 7 a.m. made out the cairn of rocks on the point of the south side of the mouth of Ungava River and the beacons on the high land beyond ; stood in by the lead as close as was safe and came to anchor at 8 a.m. ; at 9 a.m. sent a boat into the mouth of the river to Nod's fishing place to look for a pilot, as the boat was going in they met the pilot coming out, he had been sent by Mr. Low, as the boat was board at noon, as there was still enough water for us to cross the bar to the anchorage ; we did so, and anchored under Anchor Island, at 2.10 p.m. in $8\frac{1}{2}$ fathoms, to wait for to-morrow morning's tide to go up to the Hudson's Bay Post, at Fort Chimo, where Mr. Low and his party are waiting for us.

Friday, 17th September.—At 9.10 a.m. tide being high enough to cross the upper bar proceeded up the river to the post, had a thick snow storm all the way up, anchored

off the post at 12.10 a.m. under both anchors; Mr. Low came on board, he and his party are all well; landed and called at the post, where we met Mr. Matheson, the agent in charge. Salmon fishery had been a failure both here and at Whale and George's Rivers. The "Eric" had left here on the 8th September, bound south. The white whale fishery had been good, sixty had been caught. Put Dr. Bell's yacht on shore at high water and placed her in security.

Saturday, 18th September.—Took on board Mr. Low and party with all his stores and baggage, refilled water tanks and casks with fresh water; we had intended leaving to return by the afternoon tide, but the heavy snowstorm continuing decided us to hold on for clearer weather; behind the post along the fringe of woods, there is now a couple of feet of snow.

Sunday, 19th September.—Clearing at 6 a.m. we left for Port Burwell at 1 p.m. and had barely got under way when it came on to snow again, and we had snow squalls all evening; landed pilot at the mouth of the river at 5 p.m. and stood out into Ungava Bay, shaping our course for Port Burwell.

Monday, 20th September.—Snow at intervals during the night; at 11.30 a.m. ran into Port Burwell for the purpose of seeing whether the "Nimrod" was still there or not; on opening Munroe Harbour found that she had gone, stood out again at once, and ran round between the Buttons and the mainland and out through Grey Straits; had heavy snow squalls all day. We had intended going into O'Brien Harbour to shift coal, and take in ballast, but when off Cape Chudleigh, I decided that as we had a fresh westerly breeze and a rising glass, we had better go right on and make the most of a fair wind; set crew at work to shift coal; ship running her course to clear Cape Mugford under steam and canvas with fairly smooth water; had snow at intervals all evening.

Tuesday, 21st September.—Passed Cape Mugford at 9 a.m.; stood on with fine weather and fair wind; same weather continues, wind hauling a little more to the south-west.

Thursday, 23rd September.—Weather overcast with snow showers. Considerable sea from the south south-west, only making six knots to-day. We are well off shore and have seen no land since we dropped Cape Mugford.

Friday, 24th September.—Weather moderating. During the afternoon hauled in to make the land, made the land at 7 p.m. Cape Bonavista, and shaped our course for St. John's.

Saturday, 25th September.—Anchored in St. John's Harbour at 2.30 a.m., at 9 a.m. landed, met Mr. Job, and got our mails.

Sunday, 26th September.—At anchor in St. John's Harbour. From the 27th September to the 6th October we were at anchor in St. John's Harbour making necessary repairs to engines and screw, the fittings of which had got slack; taking on a supply of fresh provisions; filling the ship with coal, etc. At St. John's we landed Dr. Bell and Mr. Low with their men together with their supplies, stores and specimens.

Wednesday, 6th October.—Left St. John's at 6.45 a.m. for the north, intending to call at Chateau Bay to land our steam launch, which I am afraid to risk on deck during this trip. Had fine warm day with light off shore wind and smooth water; stood up well off shore to pass about ten miles east of the Funks.

Thursday, 7th October.—Morning opened dull and overcast. At 10 a.m. rain and fog. Slowed down at 2.15 p.m., passed close by a large berg, stopped at intervals and went ahead slow. 6.10 p.m. too dark and thick to go ahead, stopped the engines, light south to west winds and calm.

Friday, 8th October.—Weather cleared at 1 a.m. Went ahead full speed but coming down thick again at 2.30 a.m., stopped the engines, clearing again at 5 a.m., went ahead, wind changed to the north-east, and began to blow hard, sea making rapidly, hauled in for Belle Isle. Passed south of the island. Keeper signalled that he wished to speak to us, stood in under the land, he then signalled that he wanted us to

take a passenger, we answered that we were bound north and could not stop. Saw one berg south of Belle Isle and three to the north; at 4 p.m. ran in to Pitts Harbour and anchored. Landed our gig and steam launch, both boats were hauled well up on shore and placed in security for our return. Weather moderated at dark, held on here for the night. Inhabitants report considerable distress to the north as most of the residents have little or nothing for the winter owing to the failure in the fishery; agents have been sent to St. John's to procure supplies from the Government.

Saturday, 9th October.—Blowing a gale from the east all day with rain and fog, held on in Pitts Harbour.

Sunday, 10th October.—Weather clearing up, wind from the north-west. Left Pitts Harbour for the north at 6 a.m., stood round Cape Charles; at 10 a.m. came on to blow a whole gale from the north-west with a heavy snow storm. At 11 a.m. port bulwarks stove in by the sea, hauled up to get more under the land for smoother water, wind squally, at times with hurricane force. At 5 p.m. less snow, made the land at Cape Bluff and at 7.15 p.m. ran into Snug Harbour and anchored under both anchors. Fishermen came off and informed us that several schooners had been wrecked last week a little to the north of here and that the mail steamship "Leopard" was three days overdue from the north. Cod fishery has everywhere been a failure and the people of the coast are badly off, the salmon fishing was good.

Monday, 11th October.—Gale continues with snow squalls at intervals, held on here, crew engaged shifting coal into the bunkers to lighten the ship by the head, ground everywhere thickly covered with snow.

Tuesday, 12th October.—Weather moderated during the night. At 5 a.m., got in the port anchor and began heaving in on the other when it came on to snow heavily; at 9 a.m. clearing again got up anchor and left Snug Harbour passing up through Venison Tickle Run and out to sea by Boulders Rock. South-east wind and rain, passed Round Hill Island at 2 p.m., at 4 p.m. wind veered to the south-west with rain and snow.

Wednesday, 13th October.—South-west wind all night with rain and snow at intervals, considerable sea. At 4 p.m. wind got round to the north-west. At 9 p.m. wind and sea went down, ship making good progress under steam, and fore and aft canvas.

Thursday, 14th October.—Had a fine clear night, at 6 a.m. made Cape Mugford, fresh west north-west breeze with comparatively smooth water, fine all day, Sagleg Bay abeam at 9 p.m., headed a little off shore for the night.

Friday, 15th October.—After midnight, weather became dull and overcast and the breeze fell away, at 4 a.m. began to snow, long heavy swell from the eastward. At 12.45 p.m. weather clearing, sighted land inside of us headed in for it, and made out the Buttons Islands right ahead. Heavy snow squalls at intervals. Shaped a course to pass up through Grey Straits; at 4 p.m. weather getting thick and snow increasing decided to run into Sir Terence O'Brien's Harbour for the night; stood round Cape Chudleigh and ran into the harbour and anchored. Hills and rocks are everywhere covered with thick coating of snow.

Saturday, 16th October.—Considerable snow fell during the night; at 7 a.m. got up anchor and steamed out intending to stand up the strait, but once outside we met a strong north north-east breeze, with thick snow, and decided not to put out into it, so ran back at 8 a.m. At 9.30 a.m. weather appeared to be clearing, sky getting brighter overhead; decided to try again; got in anchor a second time and left; stood up Grey Straits between the Buttons and the mainland, considerable sea and heavy tide rips, with snow squalls at intervals. Abreast of the Western Buttons at 12.30 p.m., shaped a mid-channel course up the straits; by 4 p.m. breeze moderating and sea falling, bright, clear weather. Two small bergs in sight ahead. 11 p.m. came on to snow heavily, had to slow down.

Sunday, 17th October.—12 a.m., weather clearing, went ahead full speed. Wind coming round from north north-east to north-west; saw no ice of any kind since 5 p.m. yesterday, when we passed south of two bergs. At 9 a.m. ship was a good deal iced up

about the bow and top gallant forecassle, and up the fore rigging. 5 p.m., high land of Big Island abeam. We can also see the land on the south shore. At 6 p.m. slowed down as our object is to go into Douglas Harbour in the morning and shift coal; weather cloudy and overcast.

Monday, 18th October.—Our distance for Douglas Harbour being run, at 3.30 a.m. stopped the engines. 4 a.m.—Wind came round to the south south-east, blowing fresh with thick snow storm; kept the ship head to the wind to wait for clear weather to make the land. At 9 a.m. clearing a little, made the land and stood in; found we were too far to the westward. Stood about and steamed along the coast to the south south-west; snow squalls at intervals. The hills are all thickly covered with snow, and it is difficult to distinguish the islands from the mainland. At 10.45 a.m. made out Wegg's Island; ran between Joys and Westmount Islands into Douglas Harbour, where we anchored at 3 p.m. Weather got finer towards evening, with light west north-west breeze. Sent boats after water where we had got it before, but they returned without any, reporting the stream frozen solid. We saw several large schools of walrus and seals on our way in here to-day. We were also visited by five Esquimaux in their kyacks; they report deer and foxes plenty, but they brought us no meat.

Tuesday, 19th October.—Heavy squalls, with snow during the night. All hands engaged to-day shifting coal to bunkers. At 9 a.m. began to snow heavily and blow from the north-east; had to let go a second anchor at 11 a.m., then blowing a heavy gale. The lakes on shore are frozen over strong enough to cross on, the ice being four and five inches thick. There are six families of Esquimaux camped here; they moved over from their camp intending to come on board the ship, but were not able to get on board owing to the gale; they immediately put up a snow house in which to pass the night.

Wednesday, 20th October.—Gale moderated during the night, wind shifted to the west north-west, and it got much colder. Outside the harbour in the strait it looks quite thick and dark, and snow squalls are passing continually. Thermometer during the night fell to 18°. Boats that had been out searching for fresh water returned at 7 p.m.; they found no place to get water, all the watercourses being frozen solid. Ice to-day is everywhere making along shore.

Thursday, 21st October.—Had a cold night; considerable ice made in the coves and bays; heavy vapour arising from the open water in the strait. Crew engaged carrying water in buckets from a lake half a mile inland to the boats on the beach; got on board 500 gallons of water during the day. The water froze in the boats, in the buckets and about the men. Got in port anchor this evening so as to be ready for an early start in the morning if the weather is fit. Winter has undoubtedly set in here.

Friday, 22nd October.—The wind is falling and the weather looks better, though a dark vapour is either rising from or settling on the water out in the strait. At 7 a.m. left our anchorage and stood out into the strait; shaped a course to pass a fair distance north of Charles Island. At 9.30 a.m. came on to snow; we have had more or less snow every day since we entered the strait on the 15th October. Thermometer last night went down to 18°, and it was 21° on deck when we got under way, but, owing to the absence of wind, it does not feel cold. Up to 1 p.m. had fine light snow with northerly wind; away to the north of us it appears to be snowing heavily and we can see no distance. We are now standing up for Charles Island, about ten miles off the south shore. At 1.30 p.m. wind came round to the west, and it stopped snowing. We can now see a considerable distance to the north; see neither field ice nor bergs. The surface temperature to-day is 34°; it has so far been 32° and 33°. We are evidently feeling the effect of the warmer water coming out of the bay round Cape Digges. 3 p.m.—Abreast of Cape Moses Oates; continued our course along the north side of Charles Island. 8 p.m.—South south-west wind, weather dark and cloudy; going half speed. 11 p.m.—Our log and our reckoning put us about ten miles off the eastern end of Salisbury Island; put the ship about on her track, as it was too dark to make the land. Have met no ice, but cannot see any distance.

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Saturday, 23rd October.—Strong south-west wind; at 5 a.m. put the ship back to her course north one-half west and proceeded full speed; no ice in sight. Found a very strong current setting to the south-east with heavy tide rips. Daylight at 7.45 a.m., weather overcast and cloudy, cannot see any distance, at 9 a.m. came on to snow. We should be close to Salisbury Island, but the strong current may have swept us further off than we have allowed for. Where we are now we have always found ice on each of our passages in and out. At 10 a.m. snow continuing, and not being able to see any distance, decided to haul up and make Cape Digges. We must be close up to Salisbury judging by our run and, by the heavy tide rips through which we have been steaming for the last few hours, we should be in about the position where we were suddenly surrounded by the ice on the morning of the 15th July. At 2 p.m. weather clearing a little at intervals, we made the high land east of Cape Wolstenholme and stood up along the land for Cape Digges with thick snow showers at intervals. 4.30 p.m. Cape Wolstenholme abeam, as we cannot make Port Laperrière before dark, laid ship to head to the wind for the night; blowing fresh from south-east with considerable swell and snow.

Sunday, 24th October.—12 p.m. snowing steadily, wind hauling more to the eastward. At 2.30 a.m. fresh easterly wind and snow, put the ship ahead easy and steamed into the wind off shore. At 6.20 a.m. stood about and steamed back to make the land at Cape Digges. Wind north-east at 8.30 a.m. we are now close in under the high land of Cape Wolstenholme; followed the land around Cape Digges in the hope of being able to get in to Port Laperrière, but at 10 a.m. gave it up as it was snowing too steadily to risk trying to make the harbour; stood off shore head to the wind. The weather is getting colder and we are having a light dry snow which is like fog, we can see but a very short distance, kept the lead going at intervals, but had no bottom at 120 fathoms. At 2 p.m. heavy sea, the heaviest we have seen in the strait, with little or no wind; snowing steadily, sea is heaving in from the south-east, decided to steam back to Douglas Harbour, shaped our course to give Charles Island a good berth. At 4 p.m. fresh east north-east breeze, snowing heavily. 6 p.m.—as we must now be up to the western end of Charles Island slowed down for night. 8.30 p.m., wind north-east, getting clearer, sky looking bright away to the north.

Monday, 25th October.—12 a.m. clear and cold, wind hauling to the north-west with occasional snow flurries; at 5.45 a.m. we went ahead full speed for the south shore. At 8 a.m. made the land at Wegg's Island, and stood in for Douglas Harbour, snow squalls are passing almost continually. At 9 a.m. came down to snow heavily, anchored in Douglas Harbour. At 12.20 p.m. as we got into the harbour we ran into clear weather with the sun shining brightly, while out in the strait and in the outer bay it is snowing steadily. We have noticed that each time we got into harbour both here and in O'Brien's, the same condition existed; inside, moderate fine weather, outside, drift vapour and snow. The ground is much more thickly covered with snow to-day than it was when we went out on Friday morning last.

Tuesday, 26th October.—Dull and overcast. Wind round to the south-east; snowing thickly outside; we cannot even see the islands at the mouth of the harbour. Crew engaged 3 day shifting coals. At 11 p.m. wind freshening to a gale from the south-east; considerable swell running in; let go the port anchor.

Wednesday, 27th October.—Gale moderated at 4 a.m.; considerable snow had fallen during the night. We notice that much of the snow has been blown away from the tops of the hills exposed to the south-east wind. At 8 a.m. wind came suddenly round to the westward, and it began to get colder. Out in the strait it continues to be dark and thick, though in here the sun is shining brightly overhead. Crew engaged all day carrying water from the pond to the boats. At 6 p.m. wind veered to the south-west; snow drifting in clouds from the tops and sides of the hills.

Thursday, 28th October.—Wind still from the south-west and blowing hard. It looks dark and heavy outside, with considerable sea. We had intended leaving to-day for the westward, but in the face of the weather conditions and the low glass did not

consider it wise to do so. Snow is falling steadily. With the wind, as we have had it since we left Cape Digges, we know that there can be no ice south of Salisbury or Southampton Islands. 6 p.m., blowing a gale from the south-west.

Friday, 29th October.—5 a.m., calm and clear overhead. Out in the strait the same dark vapour over the water as we have noticed every day. 6 a.m., decided to get under way and leave as soon as daylight. Got in the port anchor. Daylight at 8 a.m. At 9 a.m. got in the starboard anchor and stood out. Weather fine and clear in the harbour. As soon as we got outside the mouth of the harbour we ran into snow. We can hardly call it a snow storm but there is constantly a light dry snow falling, thick enough to obscure the view and prevent us from seeing any distance. We have a fresh breeze from the north-west. Rounded the north-west end of Joys' Island at 10.15 a.m. and stood up the strait to the north-westward with the intention of going back into Hudson Bay. It is neither ice nor cold that is bothering us, but constant strong winds from various directions, never long in one quarter, and the snow. We have the greatest difficulty in picking up our points, and with the strong tides, uncertain currents, no soundings, a knowledge that the hydrography of the coast is entirely out, we believe we are running greater risks than are warrantable. At 11 a.m. the wind is now blowing forty miles an hour by the anemometer and we are making little or no progress. We can see the land on the south shore which we are following closely along, but outside of us and ahead we can see no distance at all. At 2 p.m. ship making only about three knots and icing up a good deal with the spray; one or two degrees more frost would ice us up very seriously. Heavy snow squalls at intervals. At 2 p.m. decided, after consultation with my officers, to give it up and run out of the strait; put about immediately and stood to the south-east. When we put about we were close off Wagg's Island and about twenty miles to the eastward of Cape Moses Oates. Followed along the Labrador land. At 5 p.m. came on to snow thickly, wind hauling to the north-north-east. The west end of Prince of Wales Island is abeam at 5.30 p.m. At 7 p.m. weather clearing, stars showing in the southern sky, but overcast and cloudy to the north and north-east. At 9 p.m. northern lights in the southern sky; fresh north-east breeze; weather cold.

Saturday, 30th October.—Night fine up to 4 a.m., when it came on light snow. At 6 a.m. snowing too thickly to run; slowed down and took in canvas. 7 a.m., went ahead full speed again. At 8 a.m. stopped snowing; made Hope's Advance abeam. Had snow squalls at intervals all day. The wind shifted with the squalls from north-east to west and back again several times. One large berg visible to the south of us in the mouth of Ungava Bay. The spray is freezing as it falls everywhere about the ship to-day. At 4 p.m., between the snow squalls, sighted the high land of Cape Chudleigh. Kept to the north of the Button Islands; had them abeam at 6 p.m. Stood well out past them, and at 7.30 p.m. shaped our course south along the Labrador; fresh west north-west breeze; smooth water, with considerable auroral display; all sails set. At 8.30 p.m. wind veered suddenly to the south-west and began to blow a gale, with thick snow; took in canvas and slowed down, as we could not see beyond the bow of the ship.

Sunday, 31st October.—Had a dirty night up to 4 a.m. when the weather moderated and it stopped snowing; ship iced up a good deal. At 2.45 a.m. the engineer detected a crack in the flange of the main feed pipe at the pump end; had to go slow under reduced steam until 7.15 a.m., when we stopped the ship. The faulty pipe was replaced by a duplicate, and at 9.10 a.m. we went ahead full speed. Light westerly breeze; glass rising. At 10 a.m. wind came out to the north-west, with a fresh breeze; set canvas. 9 p.m. Cape Mugford abeam. Wind hauling more to the northward; ship making nine knots.

Monday, 1st November.—Had a fine clear night with strong north-west wind; ship making $9\frac{1}{2}$ knots. The same breeze lasted all through the day. At 3 p.m. sighted high land inshore of us. We are keeping well off shore to clear the Bull Dog Island; considerable sea; crew engaged breaking the ice off the hull and rigging. We are only able to get about the ship on deck with the assistance of life lines on account of the

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LOOKING SOUTH NEAR CHARLES ISLAND (10 a.m. JULY 23).





LOOKING NORTH OFF CHARLES ISLAND (12:50 P.M. JULY 23).





LOOKING NORTH (9 a.m. JULY 26).





LOOKING NORTH-EAST - SHOWING ICE-PACK OFF SALISBURY ISLAND (3 p.m. July 25). [32]





LOOKING SOUTH (6.30 p.m., JULY 25).

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iced up condition. Weather got milder towards evening. At 7 p.m. north-west breeze died away, the wind backed to the south-west, and it again began to snow heavily. Hauled more off shore to give the Bull Dog Island an extra berth.

Tuesday, 2nd November.—At 12 a.m. had to slow down as it was snowing too thickly to run. At 5.45 a.m. weather clearing went ahead full speed. The wind is now back to the north-east and it is beginning to snow hard; at 10 a.m. blowing *half* a gale from the north; 3 p.m. made Round Hill Island. Hauled close in under the land to get less sea. Wind during the evening came round to the north-west and gradually died away. 8 p.m. fine clear night, cold and bright; sea gone down; wind west.

Wednesday, 3rd November.—At 3 a.m. passed in between Belle Isle and the north shore, and at 5 a.m. laid the ship to to wait for daylight to get in to Chateau Bay. 6.45 a.m. ran in to Pitt's Harbour and anchored. At 7.50 a.m. blowing a strong breeze from the south-west. Crew at once set to shifting coal from the hold to the bunkers. At 11 a.m. blowing a gale from the south-east, with heavy snow; let go a second anchor.

Thursday, 4th November.—At 4 a.m. wind came round to the north-west; got our steam launch and gig on board and made all snug. 11.10 a.m. got in anchors and stood out and up the strait. Strong north-west with a heavy sea; passed Forteau light at 6.30 p.m. Greenly Island light abeam at 8.25 p.m.; with this north-westerly gale we will stand well up to the westward before keeping away to cross the gulf.

Friday, 5th November.—Stood up towards Meccatina and then kept away before the north-west breeze to pass to the eastward of the Bird Rocks. Had strong breeze off north-west with considerable sea all day.

Saturday, 6th November.—North-west breeze has died out. At 4 a.m. wind came round to the south-east. 9.30 a.m. Cape St. Lawrence abeam; wind freshening from the south-east; stood along under Cape Breton land; heavy squalls with rain; kept along close inshore. At 8 p.m. made Cape George light, and it being too thick to run into the gut, laid the ship to for the night under Cape George light.

Sunday, 7th November.—Clearing up at 5.45 a.m., stood down for the Gut of Canso; at 10.10 a.m. anchored and landed at Port Hawkesbury; sent off our telegrams. Returned on board at noon and left at 1 p.m. for Halifax. As soon as we got round the automatic buoy we met a heavy sea with strong south-west breeze; as the wind was freshening and the glass falling we decided to run back to the gut and anchor till the blow was over; put the ship about at 4.30 p.m. and ran back; anchored at Hawkesbury, 9.30 p.m.

Monday, 8th November.—Strong east wind with rain. I decided to leave the ship here and go on to Halifax by the morning train, which I did, leaving the ship with Captain Whitley to come round to Halifax as soon as the weather moderated; I arrived at Halifax at 6 p.m.

The "Diana" reached Halifax on Thursday, the 11th of November, having had very heavy weather between Canso and Halifax. As soon as the ship was made fast we began landing our surplus gear and stores.

On Wednesday, the 17th November, the ship having been coaled and all stores and supplies having been landed and stored, she left to return to St. John's, Nfld., to be there handed back to her owners.

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PART II.

DETAILED ACCOUNT OF THE MORE IMPORTANT EVENTS OF THE VOYAGE, WITH OBSERVATIONS ON THE ICE MET WITH.

Leaving Halifax on the 3rd of June we proceeded directly to sea. The ship was extremely deep in the water, as besides our 400 tons of coal, stores, and supplies for practically one year and a half, steam launch and spare boats, we had on deck two large decked yachts of 35 feet over all, together with their iron ballast and boats, they were fitted internally with cabins, bunks, etc., for an extended cruise. These craft were taken north for the use of the parties sent out by the Geological Survey, the intention being to use one on the southern coast of the strait, and the other on the north for the purpose of surveying the shores. However, in spite of our deeply loaded condition, the ship made good weather and proceeded around Scatari and up along the western shore of Newfoundland. We entered the Straits of Belle Isle on the afternoon of Sunday, the 6th of June, standing on down we met our first ice off Forteau Light; the ice increased as we stood to the eastward, and shortly before midnight as it was getting heavier and closer, and the ship was taking some heavy knocks, we stopped the engines to wait for daylight. We were then in sight of Belle Isle, and it at once became a question whether we should force the ship on to the eastward and thus get through the pack which we knew to be outside of us, or stand up along the Labrador coast inside of the ice. Before leaving Halifax I had been furnished with a statement of the ice conditions, and a report showing the position of the ice from January to shortly before the time of sailing, together with a synopsis of the reports of the masters of such of the north Atlantic steamers as had met the ice on their western voyages. This had been prepared and kindly forwarded by Mr. James Elliot, of Montreal. It showed, as I myself knew, having followed the reports carefully all winter and spring, that besides being packed on the eastern shore of Newfoundland, the ice extended much further to the south and eastward than usual. The quantity of ice coming down from Davis Straits had been abnormal, it had been coming down steadily since December, 1896. The sealing steamers had found unusual difficulty in working through the ice in March and April. Many of them in fact only got clear in May. They had with one or two exceptions missed the seals, as these had passed far to the south of the usual sealing grounds. The wind we had been having since leaving Halifax had been from the north-east; it was my opinion, and that of my officers, that our best course lay in working out between Belle Isle and the Labrador shore in a north-easterly direction, in the hope of finding a lead, which would take us to the open water on the outside of the ice. We were under way again at 2.30 next morning, and soon got out of the ice into comparatively open water off Battle Harbour. It was then blowing a fresh north-east breeze, was very cold, and the ice extended eastward as far as we could see from the lookout with no appearance of water sky beyond, the ice was setting rapidly up the straits to the westward.

On our return to Halifax in November, we found that from the day of our passage up to the end of June, the Straits of Belle Isle had been more or less full of ice, this came in from the Atlantic and extended as far west as Meccatina, greatly interfering with the cod fishery.

The report of the lightkeeper at Belle Isle for June, 1897, states "that this month commenced with fresh and strong gales from east to north-east. On the 7th the ice commenced to come into the straits, and remained scattered until the 29th. The weather had been cold, foggy and wet. The first steamer passed through inwards on the 29th. Schooners bound north have been greatly delayed by the ice." Cape Bauld and Cape Norman made practically the same report as Belle Isle.

When off Battle Harbour a boat was seen coming out to us; we stopped the ship and the occupants came on board. They told us that the "Diana" was the first vessel

they had seen. They further said that we would not meet much ice, as westerly winds had prevailed in the spring, and they had had more open water than usual.

We continued at once in a north-easterly direction, heading the ship towards the most open water. It was blowing fresh from the north-east; we worked through more or less open ice all day and from the fact that there was no swell we judged that there must be a heavy body of ice outside; towards night the weather came down thick, and as the ice was coming together we were forced to stop the ship. We were at it again early in the morning as soon as it was clear; inside of us the ice seemed solid to the shore. Some of us now had our first experience of what it meant to drive a ship full speed at heavy ice, and certainly no vessel not constructed specially for the purpose could ever have stood the blows the "Diana" gave and took. Most of the ice we were in was floating 6 and 8 feet out of water, and much of it was on a level with or even above our rail; scattered through this were many growlers and a few bergs. The ice was not in large pans, but heavy lumps, and though we were often jammed fast in it there was no nipping and the ship lay easy.

From the 8th to the 19th of June we were either fast in the ice or working through it in an off shore direction. At times it would go abroad enough to let us make fair speed, at other times it would close tight about the ship, and progress in any direction was impossible. During the morning of the 19th we began to feel a heavy swell setting in from the eastward, and the ice at once began to go abroad; at 2.45 a.m. we put the ship about head to the sea, and going ahead full speed by 7 a.m. we got out of the ice into the open water of the Atlantic. We had a very rough and critical time getting out of the ice, there was a heavy sea on and the ice was rolling and boiling in all directions; in spite of the wonderful handiness of the ship and the skill of the officer in the top we got some very severe glancing blows. Any one at all conversant with ice navigation will know what it means to steam out of or into an ice pack in a heavy seaway. We had, however, to accept the risk as we had been so long fast in this ice that we dare not miss the first chance of getting out.

As soon as we were well clear of the ice we stood away along the edge of the field under both steam and canvas; during the forenoon our course was a north-easterly one but towards evening the edge of the pack falling away in the direction of the land, which though high was not visible, we were able to head to the north. On Sunday the 20th, we stood in to try and make the land at Cape Mugford, hoping to get into the Moravian Mission at Okkak and pick up an interpreter, but we found a solid pack of ice against the land which it was quite out of the question to think of entering. We kept away along the margin of the ice to the north-east, with fine clear weather; by Monday the 21st we were in the latitude of Nachvak, and about 85 miles off shore, with the ice solid inside of us. We sounded at noon 120 fathoms, no bottom, showing that we were outside the bank described by Captain Gordon in his report for 1886, when he had to steam 70 miles off shore to get 100 fathoms. We were now nearing the 61st parallel, at which line I had determined to haul square in for the mouth of Hudson Bay. The morning of Monday the 22nd of June, Jubilee day, broke fine and clear; at 5 a.m. being then, as I believed, on the 61st parallel, I decided to take the first fair looking lead and head in. We did so and found the ice in larger pans, but much lighter and more worn than that we had been so long delayed in further south. As the day advanced, the ice ran abroad more and with only a few interruptions, when we had to slow down to swing round a pan, or back off and ram at an opposing barrier, which it would have given us more delay to have worked around. We were able to hold our course all day, with very little deviation, as the lanes of open water were running east and west (true). At 5 p.m., as we were momentarily hoping to make the land, we emerged into a lake of open water, showing no ice ahead; at 6 p.m. we made the Buttons under a bank of fog which lifted as we neared the islands. While away to the north we could, from the crow's nest, make out the top of Resolution Island; being sure of our position, we shaped a course up the centre of the strait, keeping along the southern edge of a heavy field of ice which extended in a north-westerly direction from Resolution Island along the shore of Baffin's Land.

The ice we had passed through was much of it new, of only one season's growth, being about five feet in thickness; scattered through it were a few large bergs, a good

many growlers, and a considerable quantity of thick old floe ice. It was very much gone abroad, as can be judged from the fact that we had, between 5 a.m., when we first headed into it, and 6 p.m., when we made the Buttons, steamed some 80 miles in a straight line; our actual course amounted to a great deal more, though as the lanes of open water were generally parallel to our course, we never had to deviate very far from it. Needless to say we were greatly rejoiced at our good fortune in entering the strait under such favourable conditions, and pointed the ship up the comparatively open water of the strait in the hope of making an early and rapid passage into the bay. So open did we find the water that at 8 p.m. we set the patent log; we were then standing along the southern edge of a field of heavy ice which extended westward from Resolution Island along the Baffin shore; though we were compelled to take our log in again at 10.30 p.m., yet we met with no serious obstruction until next day, the 23rd of June, at 3.15 p.m., when we came up with a solid barrier of ice which extended as far as we could see right across the strait at right angles to our course.

There was a very general feeling of disappointment as we knew at once that the chances were that the whole strait was blocked as far as beyond the Narrows above Big Island. We came up to this barrier just beyond Saddle Back Island so that we had since 6 p.m. the evening before, steamed about 120 miles into the strait, we had driven the ship through some heavy belts of ice, and had given and taken blows that could not have been risked with an ordinary iron steamer. Yet since first heading in we had met no ice that would have entirely stopped such a vessel as was described by Captain Gordon as most suitable for the route, though even such a vessel could not have made as direct a course as we had done. When we stopped the ship abreast of this ice wall we were about 18 miles off the north shore land; the top of the Grinnell Glacier had been visible all day. After scanning the ice carefully from the crow's nest and finding no sign of open water in or beyond the pack, we at once decided to steam along the border of the ice to the southward with the hope of finding a lead; by 6 p.m. we judged ourselves to be about forty-five miles away from the north shore, and as the evening was hazy and a heavy bank of fog was hanging not far off to the south-east, we tied up to the edge of the pack for the night. We were under way again early next morning and continued standing to the south until we made out the south shore land in the direction of Hope's Advance. We found the ice trending away in an easterly direction (true), and seeing no sign of open water between us and the Labrador land, at 9 a.m. we put about and ran back to the north shore, intending to hang on to the edge of the ice until it ran abroad, or offered some chance of a lead through. All the authorities had advised the north side of the strait as offering the best and earliest chance of open water, as the set of the current along the north shore is steadily to the westward. At 3 p.m. next morning the weather being fine and clear, we thought we noticed a disposition to slack in the ice right ahead of us, and in one or two places a little open water began to show among the pans. We were very much in doubt whether it was wise to force the ship into the pack; my own feeling, as is shown by my log at the time, was that we could gain nothing by forcing into such a jam, but that our wisest plan would be to cruise off the edge of it, and wait until the ice went abroad; at the same time we were all anxious to go on, and if at all possible be in the bay for Dominion Day. Our orders were "to press through the strait." We had been led to expect that the ice we would encounter as we went west, though "heavier" than that passed at the eastern entrance, would be "composed of small pieces" packed loosely, appearing as if the floes had been broken up, and then drifted together; that these "innumerable small pieces" would in a great measure deprive the pack of the force necessary for the "serious injury of any vessel beset in it." When there is a nip the small pieces, being composed of "soft brashy ice" would act as a "cushion" between the ship and the larger floes, thus protecting her from "violent pressure," &c., &c. So we decided to press in, and at 3.45 a.m. on the 25th of June the "Diana" entered the pack which was slowly setting to the westward. We worked steadily ahead until 7.35 a.m. when the ice packed together solidly and we could neither go ahead or astern, and just here let me say that the first intimation we usually had that the ice was running together was an inability to go astern, the ice would close in quickly behind the ship and prevent us from using the screw astern, thus preventing us from backing off to ram ahead invariably when this happened we were

set solid at once. We were set fast until the evening; about dinner time the ice slackened off enough to let us surge the ship ahead and astern and get some way on her, when at 6.30 p.m. we went ahead and made fair progress until 10.45 p.m. when we were jammed up solid again; as we got to the west we found the pans getting larger and heavier. When forced to stop the ship, we invariably tried to do so in what our first officer, who was an old and experienced ice master, called a soft spot, that is in small ice, or in a bay or cove in a larger pan with projecting points ahead and astern, which would shelter or protect the ship from direct pressure. Our experience, however, during all the time we were in the ice in the strait was that whenever shoving began, the heavier pans sailed through or over all this small ice, so that it was little or no protection to us. The shoving always began with the flood tide, it occurred sometimes during slack water, due to the action of the wind on the heavily rafted pans, and it would come with a rush during a squall; it was at its worst when the wind and tide co-operated. From the evening of the 26th until the afternoon of the 29th of June, we were set fast, and driving slowly up the strait in the direction of Big Island. At times the nipping was severe, and we were forced to resort to powder and dynamite to relieve the strain on the rudder and the after part of the ship. The blasts were set off on the ends of poles, which were placed under the ice at the points of greatest pressure. The pans which surrounded us were many of them fully a mile in circumference, and where holes were made to get the blasts under the ice we found the thickness to be from ten to fifteen feet. During the afternoon of Tuesday the 29th we began to feel considerable swell in the ice; we immediately went ahead but did not get far, as shortly before 6 p.m. the ice came together quickly, and we were hard and fast again. On Wednesday the 30th of June, during the afternoon, the ice slackened away, and we at once went ahead and made considerable progress for about five hours, when again the ice came together quickly and we were jammed fast. We were by this time well up with the eastern end of Big Island, and about 15 miles off shore; the ice about us we found, from actual measurement, to be from five to nineteen feet in thickness. The ship was very severely nipped this evening. The ice was rafting and forming in pressure ridges all about us; for the first time things looked serious. We got our provisions on deck, and had them divided into convenient packages; the boats were swung out, and got ready for lowering quickly; all hands were told off to their different boats; the ship strained and groaned, as we all stood helplessly by. However, as we were momentarily expecting the ice to go through her, she was suddenly lifted out of the water, the ice passed anunder her, she ceased to be waterborne, and for the time the danger was over. The wind was now blowing half a gale from the south-east, and the whole pack was driving up against the shore of Big Island. In this condition we passed Dominion Day and the following night. About 10 next morning—2nd July—a large and heavy pan, which we had noticed some little distance astern of us, came on suddenly with the wind and tide, and, driving all the lighter ice anunder or to one side, brought up against our stern, driving the ship bow on into the ice ahead of her, and, the moment she brought up, forcing the rudder to one side and carrying away the stock (a piece of 14-inch oak) just about the water-line. The ship was straining greatly, and for a time we felt sure that the rudder-post and screw would go with the rudder; but again she lifted, and the pressure was at once relieved. Our officers and crew, men who had been accustomed to ice all their lives, were astonished at the weight and thickness of the ice about us, and at the manner in which it was surging and swirling about. It is needless to say that no ship, unless specially constructed for the purpose, could have withstood for an instant the pressure to which the "Diana" had been subjected during these days; and even the "Diana" could not have survived had she not allowed the ice to pass anunder her. Between the 1st and the 4th of July the ice continued shoving, and pressure ridges were formed in various directions about the ship. With the falling tide the pressure was always relieved, and we worked the ship in an off shore direction whenever the ice was slack enough; but it never ran abroad sufficiently to permit of our going far. The most we could gain at any time never being more than a few hundred yards; our main object in moving at all was simply to keep the ship from driving any nearer the land, and to work her into a softer berth and away from the heavier pans which kept forcing towards the shore through the lighter ice. All this time the wind was blowing steadily from the east, with fog and rain at intervals.

We had our most severe nip of all on the evening of the 4th of July; the squeeze came heaviest abaft the fore chains, where the ice piled up on the port side level with the rail; the main and 'tween deck beams were hove up, they were regularly bowed up in the centre, the oilcloth on the cabin floor was gathered up in ridges, the deck fastenings were started, the seams and butts opened, and as it was raining at the time the water poured down into the cabins below, the fore rigging hung limp from the mast head like garlands from a May pole, and things generally looked blue; those who were below came tumbling on deck one over the other, prepared to take to the ice at once. However, just as we were expecting to see the ship's sides come together, she took a list to starboard; owing to the pressure of the ice having risen on the port side, in doing this she presented her starboard side at an angle to the ice on that side of her, and at once slid upon it, the ice passing anunder her, she ceased to be water borne and the danger was over, this could not have happened with a deeply laden or even a wall sided ship. This was the last nip we had, after this date the wind moderated, and began to blow from the north shore of the strait slackening the ice away from the shore of Big Island. The ice came up from anunder the ship and though it came together again with the rising tide yet there was no more rafting and shoving. On the 6th of July we got under way and began to work ahead through the ice, the ship made no water and it surprised some of us who had not had any previous experience of the work, to see how she came to herself again—after a few rains she seemed to open out, the deck seams and butts closed, the rigging began to be set up of its own accord, and generally she began to feel more solid under us than she did when we first moved her. On the morning of the 8th of July we got our first glimpse of open water to the south of us, just a few streaks where the pans had opened out a little, we at once began to work for it; at first the ice was very heavy and firm, and we had great difficulty in getting way enough on the ship to give her any chance, but as we got further off shore and the ice was softer and more open, her speed increased, she made better way and we drove her hard at it. On the 9th we had thick fog all day, the ice did not go abroad to any extent, and we made but little headway. On the 10th there was a great change, and we made a good day's work, getting by night into some comparatively open water. By the 11th we were close over to the Labrador shore and found the ice gone well abroad; by midnight we had passed Charles Island; all this time the heavy solid pack was close on our starboard hand, extending away to the Baffin's shore, and we were steaming along its southern shore in fairly open water. We had Cape Digges at the western end of the strait abeam at 2 p.m. on Monday, the 12th of July, with no ice in the direction of Hudson Bay to stop us, but were obliged to stop the ship owing to the fog. This however cleared up after a couple of hours when we at once went ahead again and stood across in the direction of Mansfield Island. We met no ice that would stop any ship, and on the evening of the 13th put about and steamed back with the intention of going out of the strait again. We had, however, on our way back, to land the two geological parties that we had on board, and as Dr. Bell, who was detailed for the survey of the north shore of the strait, wished to be landed at or near King's Cape at the south-eastern entrance to Fox Channel, we set our course on the morning of the 14th from Cape Digges to pass to the eastward of Salisbury Island and thence over to King's Cape. We had considerable fog during the day, which necessitated frequent stoppages, so that it was late in the evening before we made out the eastern end of Salisbury Island. We found our further progress barred by a stream of heavy ice which was pouring out of Fox Channel, filling the entire strait between Baffin's Land and Salisbury Island, and also the narrow pass between the latter island and Nottingham Island. This ice was setting to the eastward at the rate of five knots. There being a good deal of fog we could not fully make out the conditions, so we laid by for the night, holding the ship a short distance from the edge of the pack. The weather cleared up early on the morning of the 15th and we steamed along the margin of the ice close up to the end of Salisbury Island. The ice we had to the north of us, and into which it would have been folly to have put the ship, was heavier than anything we had yet seen in the strait. The pans were large and greatly discoloured, much of it was floating five and six feet out of the water, showing that it was of considerable depth. I informed Dr. Bell that it was impossible to attempt to get to King's Cape to land him, and that I would try and do so

further to the eastward. We at once put about intending to stand to the eastward and look out for an opening by which we could get over to the north shore, or failing this, land the other party which was conducted by Mr. Low at the first available point on the Labrador or south coast; we put about at 7.30 a.m. and had not gone more than a mile from our turning point before we were suddenly surrounded on all sides by heavy pans of ice; we had been careful not to get into the stream which was passing to the north of us; all night we had noticed the remarkable way in which this ice was surging and jostling in all directions, the tide or current fairly boiling among the pans. Pans of many acres in extent were moving at the rate of five knots, some east others west, while the heavier and more extensive ones were moving with irresistible force through or even across the track of the lighter ones, the whole in the most amazing confusion. We were steaming along at fully eight knots, looking with wonder at this astonishing turmoil and exhibition of confused power when there suddenly shot out from the field ahead of us a wing of ice of many miles in extent, a similar wing came up from the ice astern and before we could extricate the ship we were beset closely in the whirling, grinding mass. The conditions were extremely serious and we used every exertion to extricate the ship; the open water was only a short distance to the south of us, but in spite of all we could do during some three hours, we did not make more than 100 yards, and finally our screw jammed fast so that we could neither move it ahead or astern. At 11 a.m. there was a sudden increase in the shoving and rafting, and one particularly heavy pan forcing down through the ice about us, took the ship fairly on the port side; she was suddenly lifted some three or four feet out of the water, and was carried spinning about on the pan which had passed anunder her, but relieved from all pressure. This rather astonishing condition of things lasted for a couple of hours, when at about 1 p.m. just as quickly as it had come together, the ice went abroad again, the grinding ceased, the pans separated, the ice began coming up with a loud noise from under the ship, she became waterborne, and in half an hour we were steaming on our course at full speed in fairly open water. This fortunately was the last occasion on which we got fast; though we were in ice several times again during the next two weeks, it was always loose and gone abroad, and we had no difficulty in holding our course through it. We trimmed along the edge of the ice until next morning, the 16th, without finding any lead which would allow us to make the north shore. I had now to think about getting Mr. Low afloat. We had been unable to land him anywhere to the west of Charles Island because of a belt of ice along shore through which he could not have penetrated in his yacht. At 4 a.m. on the 16th we found ourselves broad off the entrance to King George's Sound with no ice to prevent our entering. I at once decided that this was the best chance to put Mr. Low afloat on his own account, as he was very anxious to be off. The ship was therefore headed in for the sound. We went in slowly, as the place was unsurveyed, and took the precaution of sending a boat about half a mile ahead with a hand lead. As we got close in and were making for what appeared to be a pass between two islands we were met by four Esquimaux in kayacks. They made the most frantic cries and gestures with the object of explaining to us that the pass was bad and that we should find an anchorage in another direction, which we did. We had at this time no regular interpreter on board, as we had not been able to call anywhere on the Labrador to secure one, and though several of our men had previously been among the Esquimaux with Peary or on whaling vessels and knew a little of the language, yet none of them were expert enough to keep up any conversation. We anchored on the western side of the sound at 8 a.m., and at once prepared to hoist out Mr. Low's yacht. We had her afloat by 4 p.m. We had to shift our anchorage several times owing to the ice which was coming out of the inner bays, and as it would not have been safe to remain where we were during the night I had sent the second officer with a boat to look for a safer anchorage further in behind the islands. He returned during the afternoon and reported finding a safe and commodious harbour with nowhere less than seven fathoms in the entrance. We at once went in and anchored in it. We found it to be roomy, free from rocks or shoals, and sheltered from all winds. This place I called Douglas Harbour. We were glad on many occasions throughout the rest of the season, and more particularly during the stormy weather in September and October, to run into it for shelter. We were engaged during Saturday,

the 17th of July, ballasting, rigging and putting the stores in the yacht. On Sunday morning, the 18th, we parted company with Mr. Low, who stood up the sound, while we left to land Dr. Bell on the north side of the strait.

We had now to face back to Big Island, having decided to put Dr. Bell afloat at Ashe Inlet. To do this we had to cross the strait pretty much over the track that we had taken when working out of the ice in which we had been fast from the 1st to the 9th of the month. We found a great change in the conditions. The ice had become greatly worn and thinned. It had gone abroad, and presented no serious obstacle to our passage. We made the beacon near Ashe Inlet at 7 p.m., but owing to fog along the land we had to lay off for the night. Early next morning, the 19th, we were off the mouth to the inlet, but found it full of ice, so much so that we could not get in. The ice in the inlet was undoubtedly that which had formed there during the winter, and which had just broken up. The shore ice was still fast to the rocks all round.

We backed off a few miles and held on, expecting that the ice would be carried out with the falling tide. At 9 a.m. we went in again and found that it was pretty well gone, so that we steamed up to the anchorage and let go our anchor off the observing station erected by Captain Gordon in 1884. We had Dr. Bell's yacht afloat and ballasted by 6 p.m., the wind had freshened to half a gale by 7.30 p.m., and as the ice was coming back into the inlet, which was quite open to the south south-east, we had to cast the yacht off and let her run further in, where she would be in shelter. We held the ship at her anchorage, but had to keep her under steam during part of the night so as to steer her clear of the ice. The wind went down during the night, and with the turn of the tide the ice went out. Early next morning the yacht got back alongside, and Dr. Bell's stores being on board by noon we parted company, the Dr. intending to cruise to the west along shore, while we left for the Button Islands.

Once clear of the inlet, the breeze being fair, we set our sails, got the patent log out, and for the rest of that day the "Diana" made her ten knots by the log; the only ice in sight being one or two small bergs. We had a fine run down to the Buttons, which we made about nine the next morning. We saw ice in Ungava Bay, and a light stream of it was coming out by the Buttons, and wheeling down along the outer Labrador shore. We had the islands ahead, about ten miles to the south, and seeing no ice outside of us to seaward, we put the ship about and started back to Hudson Bay at 11 a.m. on the 21st of July. We got back to Cape Digges at midnight on the 23rd, steam ing the whole length of the strait in sixty-one hours, including a stoppage of four hours on the night of the 22nd, when it was too obscure to see our way through a heavy belt of ice which barred our passage off the Maiden's Paps; we had also a strong breeze against us. Our intention in making this direct run was to see how long it would take us to make the passage of the strait. In doing this we drove the ship as directly through everything as we could, and though we met no ice through which a strong iron ship could not have worked her way, yet she could not have risked driving through some of it as we did, and a less handy ship than the "Diana" would have had delay in working round or among the larger pans. On the 24th we steamed back from Port Laperrière to the eastern end of Salisbury Island, to have another look at the entrance to Fox Channel. Between Digges and Salisbury we found no ice in crossing, but between Salisbury Island and Baffin's Land the channel was filled with heavy old ice, which was passing in a stream to the eastward. We kept away along the southern edge of this, and were gradually headed away to the south, off the eastern end of Charles Island. We found the ice extending right in to the south shore, where we had passed along in open water on our way west only three days before. The ice was open and much worn, being water soaked and soft. We had been headed away from our proposed mid-channel course by this ice, so that we were now close up with the Labrador land. When nearly up with Wegg's Island, we changed our course and headed the ship across the strait in the direction of Emma Island; as we got near the north shore and found the ice more open, we kept the ship away for Big Island. At 5 p.m. on Monday, 26th July, we were quite clear of the ice, which was extending in a much scattered condition away in the direction of Hope's Advance. We at once set the log and shaped a course for the Buttons. By 8 a.m. next morning we had made 125 miles, and as we had a few days to spare before meeting our coal supply ship at Nachvak, I



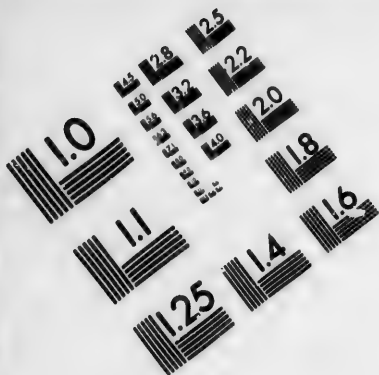
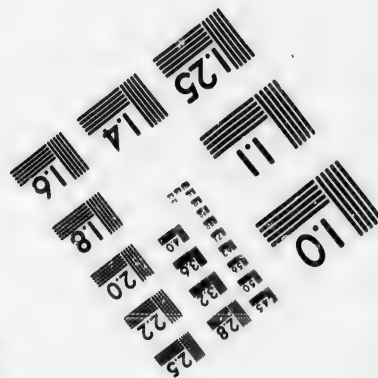
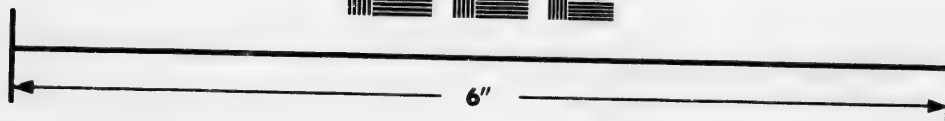
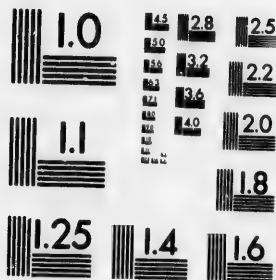


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decided to go and look for Green Island. The existence of this island in the mouth of the Ungava Bay had been constantly disputed; some asserting that it really existed, others having positively denied its existence. Captain Gordon had failed to find it, and had advised its removal from the chart. We hauled the ship up for the supposed position of the island, and at 11 a.m. on the 27th we made out high land where the island was placed on the chart. We were, however, prevented by the ice which filled Ungava Bay from getting near the land we saw, and the mirage was so great that we could form no estimate of the size of the island. At 1.30 p.m. we kept away along the edge of the ice in the direction of Port Burwell which we made that same evening; we could not, however, get in, as a belt of ice about ten or twelve miles wide separated us from the land. We held on for the night to a pan which was drifting in the direction of the Buttons, and at 2 a.m. on the 28th we cast off and steamed round the Buttons and out to sea. We passed through considerable much-worn and open ice, extending in long strings at right angles to our course, with lanes of open water between. We got outside of all this by 9.45 a.m., and saw no sign of any field ice beyond. A few bergs were scattered here and there, and there was a slight swell from the eastward; any vessel could have safely steamed through all the field ice we met this morning. Having satisfied ourselves that there was no more ice to the eastward, we put about and ran back through the ice to Sir Terence O'Brien Harbour, inside of Cape Chudleigh, and anchored. Leaving this harbour on the morning of the 30th, we steamed down along the Labrador to Nachvak. We did not get into the Bay of Nachvak until Sunday morning, the 1st of August, having been delayed by fog. We saw no field ice on our way down, and very few bergs. When we reached the anchorage of the Hudson's Bay post, we were at once boarded by Mr. Ford, the agent in charge. We had expected to meet the Hudson's Bay Company's ship "Eric" here, but found that she had left for Churchill a week before. She must have passed in along the north shore of the strait while we were looking for Green Island. We remained at Nachvak until the 13th of August, overhauling our engine and boiler, shipping a new rudder which we had on board, taking in 300 tons of coal, and cleaning up generally. We found from Mr. Ford that the ice had only gone out of Nachvak Bay in the beginning of July; so that we could not possibly have got in on the 21st of June when we had passed on our way north.

On leaving Nachvak we proceeded directly to Cape Mercy, at the easternmost point of the entrance to Cumberland Sound. Our course took us right across the mouth of Hudson Strait, about 45 miles outside the Buttons; we saw a few bergs, but no field ice whatever. We made Cape Mercy early on the morning of Sunday the 15th of August, and steamed along the north-east shore of Cumberland Sound up to the whaling station at Kekerton. We were here informed by Mr. Milne, the officer in charge, that the season was a remarkably open one; that it was quite unusual to find the sound free from field ice as it now was; that in 1896 it had been full of ice all season, and that we could hardly have got up to Kekerton. On the 18th of August we crossed the sound to the only other sedentary whaling station now in operation on Baffin's Land—at Black Lead. Here we met Mr. Sheridan, the agent in charge, and the Rev. Mr. Sampson, an English missionary to the Esquimaux. We left Cumberland Sound for Churchill, on the western shore of Hudson Bay, on the evening of the 19th of August. We only made Resolution Island on the morning of the 21st, having been delayed by fog; passed into the strait to the westward of the Buttons, and round to Port Burwell, where we anchored at 2.30 p.m. We saw no ice on our passage from Cumberland Sound. At Port Burwell we found the SS. "Nimrod," belonging to Messrs. Job Brothers of St. John's, Nfld.; cod had just struck, and her crew were doing well. We left again the same evening for the west; had a stormy passage up the strait abreast of Big Island; were off the eastern end of Salisbury Island at 9 a.m. on the 24th of August, and found the channel across to King's Cape still blocked with ice. We made no attempt to enter the pack, but kept away for Churchill, passing south of Nottingham, and down between Coates' Island and Mansfield. We had strong winds and dirty weather crossing the bay, and only got into Churchill Harbour on the evening of Sunday the 29th of August. We saw no ice after leaving Salisbury Island.

We left Churchill on the 2nd September, and spent a couple of days trying for fish in the bay. I intended devoting a week to this work, but the weather was so rough

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that we could do nothing in the way of fishing, and as we were due at Ashe Inlet on the morning of the 10th of September to meet Dr. Bell, I had on Monday the 6th of September to give up my fishing and get under way for the strait. We might have held on a day or two longer, but there was always the chance, against which we had to provide, that the Fox Channel ice might with the strong north-easters which we had been having, wheel down against the Labrador shore and to some extent block our passage out. We rounded the long shoal off the south end of Mansfield on the evening of the 6th of September, steamed round Digges in a snowstorm. At 2 a.m. on the morning of the 7th were off Cape Wolstenholme in open water, saw no ice, but there was a distinct ice glint to the north-east. We found this morning the land of Labrador everywhere covered with new snow, we had snow at intervals all day on the 7th, and during the next night we were forced to lay the ship to off the eastern end of Charles Island for eight hours during a heavy snow storm. We steamed in and made the land as soon as it was light, and anchored in Douglas Harbour during the afternoon. Here we found everything having a wintry look, the ground was covered with snow, in some places drifted to a considerable depth.

We went out of the harbour on the evening of the 9th and steamed across the strait for Ashe Inlet off which we were at 5 a.m. on the 10th. It was then blowing a gale from the south-east with a heavy sea. We dare not venture in to anchor as the sea was running right in, and there was no shelter there for us. We held the ship off the mouth of the inlet for some time hoping that Dr. Bell or his men would make her out and know that all was well, and that we were on hand to pick them up. We then stood off shore and laid the ship to, to wait for fairer weather; at 10 a.m. the gale was increasing, and as it was snowing heavily, we decided that it would be more comfortable in harbour, so we kept the ship away and ran back for Douglas Harbour, we were lucky enough to pick up the islands outside and got to our anchorage at 4 p.m. The weather cleared up during the afternoon of the 11th and we left at once to return to Big Island, making the inlet at daylight next day; there was no ice whatever in the strait between Douglas Harbour and Big Island. We got Dr. Bell and his party with their stores and specimens on board, and as Dr. Bell wished to have his yacht taken to Fort Chimo we took her in tow and left about noon on the 12th for Ungava, where we were due to pick up Mr. Low and his party on the 15th. It was my intention on this passage to settle the question of the existence of Green Island, therefore on leaving Ashe Inlet we shaped our course for the spot where we had sighted land on the 27th of July. We had a fine clear night crossing and made out the land we were in search of at 2 a.m., we laid by for daylight and at 6.30 a.m. steamed in for the north-east point of the island, which we found to be very much larger than Green Island, as it was laid down, could possibly be. At 10 a.m. while steaming along the south-east shore of the island, looking for a landing place we sighted several natives in kayaks in under the land, on standing towards them and hailing, two of them came off to the ship, they told us that the island was Akpatok, and that there was no such place as Green Island. Akpatok Island is therefore wrongly placed on the chart, being shown some 25 miles too far south in Ungava Bay. The natives directed us to the best anchorage, and as soon as we were anchored I sent a boat on shore with Dr. Bell who was anxious to examine the rocks. Akpatok Island is of great extent being some 60 miles in length; it lies almost north and south (true) and is remarkable on account of its precipitous limestone walls.

The natives we found here had been the first to visit the island for a long period of years, they had made an extraordinary bear hunt, and reported walrus to be plenty also. They had been fitted out by the Hudson's Bay agent at Fort Chimo, and were honest enough to refuse to sell us their skins, as they said they belonged to the Hudson's Bay Company; on our telling them that we knew the agent, Mr. Mathewson, and would make it all right with him, they then offered to give us their skins, but with the proviso that we should take them to Mr. Mathewson and arrange with him for payment, so that he might credit them with their value; as we knew that the Hudson's Bay Company would not sell us any fur, this arrangement would not have suited us, so that we did not get the skins. These were Pagan Esquimaux and I merely mention this fact to show how strict were their ideas of honesty compared with the practices of the white christians living to the south of them.

In January, 1860, Akpatok was the scene of a terrible crime. The barque "Kitty" had left London on the 21st of June, 1859, for Hudson Bay, she was nipped and crushed in the ice on the 5th of September off the Middle Savages, the crew left the ship in two boats and made the land on Saddle Back Island, both these boats attempted to cross the strait, and work their way down the Labrador; sixty-one days after one of them reached the northernmost of the Moravian Mission stations. The other boat with the captain and ten men landed on Akpatok Island, they were at first hospitably received by the Esquimaux, but as food grew scarce, and the natives began to realize their helpless condition, they were all murdered one night while sleeping in their tents. It is said that the Esquimaux who perpetrated this outrage all died on the islands shortly afterwards; be that as it may, the island was soon after deserted, it was supposed to be haunted and until this present season the natives could never be persuaded to go near it. We left Akpatok at noon on the 14th intending to pass the night under Saiglorsoak Island, and next morning steam over to the mouth of the Koksoak River and meet the pilot that Mr. Low had promised to have out for us. Saiglorsoak Island, however, was not where we should have found it, and we only got to the mouth of the Koksoak on the morning of the 16th. We met our native pilot and steamed up the river in a thick snowstorm, anchoring off Fort Chimo at noon on the 17th. Here we found Mr. Low and his party in good health, and were very kindly received by Mr. Mathewson, the agent in charge. It was winter here, there being several feet of snow on the hill sides in the rear of the post. We left Fort Chimo at noon on the 19th going down the river in charge of our Esquimaux pilot, again in a snowstorm. We had snow at intervals all that night and next day. I had intended calling at O'Brien Harbour to shift coal, and take in a few tons of rocks for ballast before continuing to St. John's, Nfld., where I had to land the geological parties and re-coal, but on nearing Cape Chudleigh Islands, which form the seaward shelter of O'Brien Harbour, I decided that as we had a rising glass and the beginning of a fresh westerly breeze, it would be better to keep right on, shift my coals at sea, and dispense with the extra ballast, this we did. We rounded Cape Chudleigh on the evening of the 20th; made a fine run down to St. John's where we anchored at 2.30 on the morning of the 25th. The "Diana" had averaged nearly nine knots on the run back, we saw no field ice and very few bergs.

At St. John's we were treated with great kindness by His Excellency the Governor Sir Herbert Murray, Mr. Job the owner of the "Diana" and all others. We remained there making a general overhaul and taking in a further supply of coal until the morning of the 6th of October when, as soon as it was clear, we left to return to Hudson Bay. We had fine weather up to Belle Isle, but beyond that almost constant gales and snow; we ran into Pitt's Harbour on the 8th to land our steam launch and extra gig; were detained there until the morning of the 10th. We had barely got round Cape Charles when we met a heavy north-west gale and snowstorm; we hauled in under the land at Cape Bluff and got in to Snug Harbour for the night; the gale and snow continued until the 12th when as soon as it moderated and cleared we continued north. We made the Buttons at noon on Friday the 15th and shaped our course to pass south of the islands up through Grey's Straits, but just as we were passing Cape Chudleigh it came on to snow heavily; it had been snowing at intervals all day. The weather looked squally and bad and we decided to run into O'Brien Harbour and anchor for the night. Everything had a wintry look ashore and a good deal of snow fell during the night. The weather cleared shortly after breakfast next morning, the 16th, and we went out for the second time, we had gone out at 7 a.m. but finding it dark and snowing heavily outside in the strait we had returned to our anchorage. We passed the Western Buttons shortly after noon, and shaped a mid-channel course up the strait, had snow at intervals during the afternoon and night; there was some swell on, as the wind was pretty well ahead and the ship iced up considerably about the bows and fore-rigging, nevertheless we made fairly good way and by 5 p.m. on the 17th we had the high land of Big Island abeam, we slowed down during the night as we intended calling at Douglas Harbour to shift coal and take in fresh water. During our former passages through the strait in the summer we never had any difficulty in getting a supply of water, as it was only necessary to make fast to an ice pan and put the end of the suction hose over into one of the pools of fresh water which accumulate on the surface of the ice and

The barque "Kitty" was snipped and crushed and left the ship in two attempts to cross after one of them. The other boat with the hospitably received to realize their help their tents. It is the islands shortly was supposed to be persuaded to go near light under Saiglorak River and meet k Island, however. h of the Koksoak up the river in a here we found Mr. y Mr. Mathewson, h snow on the hill h going down the snow at intervals our to shift coal, hn's, Nfld., where Chudleigh Islands, s we had a rising er to keep right lid. We rounded St. John's where averaged nearly

ney the Governor. We remained of coal until the return to Hudson instant gales and a and extra gig; got round Cape led in under the e and snow con- continued north. se to pass south pe Chudleigh it. The weather and anchor for now fell during the 16th, and we rk and snowing ed the Western it, had snow at s the wind was d fore-rigging, the high land ing at Douglas ssages through of water, as it tion hose over of the ice and

pump away, there being no field ice about in October we had to seek our fresh water on shore. It snowed steadily during the early morning of the 18th and we had some difficulty in finding our harbour, owing to its being almost impossible to distinguish the islands from the mainland, when both are alike covered with snow, the former do not show in relief against the high land behind. We anchored in Douglas Harbour at 3 p.m., the same Esquimaux that we had met with here in July were now camped in a cove in the outer bay for the seal and walrus hunt; during our visits here in September they had been away inland for the deer hunt, they were greatly rejoiced to see us back. On the 19th they moved over to Douglas Harbour, men, women and children, intending to come on board, but by the time they reached the beach near the ship it was blowing a gale from the north-east with drifting snow and as we could not attempt to land a boat on the rocky beach to bring them off, owing to the heavy surf, they at once set to work and in half an hour had built an igloo or snow hut in which they passed the succeeding night in warmth and comfort, though they had no fire. The gale of the 19th prevented us from sending boats after water, but next day the 20th the wind having moderated and veered to the north-west they were despatched up the north-west arm where we had found several good streams of water in the summer, but late in the evening when we were getting anxious about them they returned without any water, as they had found all the streams frozen solid to the bottom. On the 21st we got our water tanks filled from a lake half a mile inland, the water had to be carried by hand to the boats on the beach; it froze in the buckets, about the boats and on the men. On the 22nd the morning was fine and we left at 7 a.m. for Hudson Bay. It was just light by 8 a.m. At 9.30 a.m. or as soon as we had got fairly out into the strait it began snowing again. We had had more or less snow every day since passing Cape Chudleigh on the 15th. During the afternoon of the 22nd the weather came bright and clear overhead, and we passed about ten miles to the north of Charles Island, shaping our course for the eastern end of Salisbury Island hoping to get a final look into the mouth of Fox Channel in the morning. We steamed slowly back and forth on our course during the night which was very dark. At 7.45 a.m. on the 23rd we supposed ourselves to be close up to the island and knew by the tide rips and the strong current that we were about the neighbourhood where we had heretofore found ice. At 9 a.m. it began to snow heavily, we held on for a while hoping that it was only a squall and would clear up, but by 10 a.m. it had settled into a heavy snowstorm and, as the currents were so strong and uncertain, we gave up attempting to make the island and steamed away to Cape Digges; during the afternoon we got close up against the land of Cape Wolstenholme. We made this land several hours before we should have, and too far to the eastward, showing that we had been swept to the south-east during the night. We followed close along the land which is bold to, until dark. About 4.30 p.m. we headed the ship off shore and kept her under easy steam, head to the wind for the night, it was blowing fresh and snowing. We made Cape Wolstenholme next morning, the 24th, at 8.30 a.m. and followed closely along the land, round Cape Digges, hoping to get into Port Laperrière and hold on there for clearer weather, but it was snowing too heavily to risk making the harbour. The shore was everywhere covered with snow and one point looked so exactly like another that we could not make out the entrance. We could only see a few feet above the water line on the beach, the hills were obscured in the drift so that we could distinguish nothing. It was freezing hard, and wherever the spray fell it froze. At 10 a.m. being then in Hudson Bay, off the south-western point of Digges Island, we put the ship off shore, head to the wind; it was blowing a strong breeze from the north-east with considerable sea. By 2 p.m. there was an unusually heavy sea running, and to get about at all on the slippery decks we had to stretch life lines to hang on by. It was snowing heavily all the time and showed no sign of clearing up. We then decided to steam back to the eastward, while we could get a good departure. During the early morning of the 25th the wind hauled to the north-west, and it cleared up a little; we got a glimpse of the high land of Cape Moses Oates and soon after made the Labrador shore which we followed along, anchoring in Douglas Harbour shortly after noon. It had been snowing all morning, but when we got under the shelter of the land we ran into clear weather. On the 26th the wind was back to the south-east, and it was snowing again so thickly that we could not see the

islands off the mouth of the harbour. During the afternoon it freshened to a gale and we had to let go a second anchor. During the 27th and 28th we remained at anchor. It was dark and stormy in the strait and we could not see any distance off shore; in harbour the weather was variable, snow flurries passing at intervals, the wind shifting constantly from one point to another. On the morning of the 29th the weather looked better, and I decided to get back into the bay. We got our anchors in and left at 9 a.m. It was then clear in the harbour, and for some little distance outside among the islands. At 10.15 a.m. we were fairly out into the strait, and shaping our course to pass close off the eastern end of Charles Island; it was then quite thick ahead and to the outside of us, the tops of the hills inshore were enveloped in drift, but we could distinctly make out the foot of the land; by 11 a.m. it was blowing a half a gale right ahead and freshening with a short breaking lop; we kept at it until 2 p.m.; the ship was now icing up rapidly about the bow and up the fore-rigging, as wherever the spray struck it froze fast. At 2 p.m. we decided to put about and run out of the strait. We rounded the Buttons at 7 p.m. on the 30th and stood down the Labrador. We had rough weather and snow all the way back, took our spare boats on board at Pitts Harbour on the 4th of November, and after securing them continued same day for Halifax, passed Cape St. Lawrence on the morning of the 6th, called at Canso and reported on Sunday the 7th, met a gale of south south-west with heavy sea off Canso same evening and had to run back for shelter, as the ship was too light to make good weather. Monday the 8th was spent at anchor in the Gut of Canso, the crew being engaged in filling the bunkers from the mainhold so as to trim the ship more by the stern. We left again for Halifax on the morning of the 9th, and had very heavy weather that night and next day, during the afternoon of the 10th a sea boarded the ship abaft the fore-rigging on the port side breaking up and washing away one of the boats. We arrived at Halifax and made fast to the Marine wharf at 1 p.m. on Thursday the 11th of November.

PART III.

SHORT ACCOUNTS OF SOME OF THE EARLIER VOYAGES TO HUDSON BAY AND STRAIT.—STATEMENTS OF THE VIEWS OF WHALING CAPTAINS, AND MY OWN CONCLUSIONS ON THE SUBJECT OF THE NAVIGATION OF THE STRAIT.

I propose here to submit short accounts of some of the earlier voyages of exploration to Hudson Strait and Bay, together with statements obtained from some of the United States whaling captains who have made frequent voyages through the strait, and wintered either there or in the northern part of the bay. I do not propose to say anything about the voyages of the Hudson's Bay Company's vessels, which have been made regularly since the first establishment of the company on the shores of the bay; these vessels have generally gone in late in July or early in August and out again in September. There was no object in their making the passage any earlier in the season as the boat expeditions bringing the furs from the interior of the country could not arrive at the coast depots before the end of July, while, as soon as the imported supplies were landed, and the furs and the products of the season's fishery shipped, there was nothing more to wait for and the sooner the vessels then got back to market the better. The fishery was, then as now, made in July and August when the trout and salmon were running up the rivers from the sea, the white whale fishery being carried on in the rivers during practically the same season. When the company's vessels were detained later than the middle of September it was always due to their late arrival; owing to head winds, calms, or detention in the ice, they sometimes could not reach the ports of Churchill, York, or the head of James Bay before September; in such a case there was delay in getting away and, on a few occasions rather than risk the outward passage of the strait, the vessels were compelled to winter in the bay. The vessels here referred to were, of course, sailing ships, and most of the detentions from which they suffered were such as would not have delayed steamers to any great extent. The experience, therefore, of the Hudson's Bay Company's ships, covering, as I have explained, only the season between the latter part of July and the end of September, is of no use in deciding the conditions of navigation in June, the beginning of July and October.

The original charter of the Hudson's Bay Company was granted in 1668, in which year Prince Rupert sent an expedition into the bay under Captain Zachariah Gillam in the "Nonsuch." They wintered at Rupert's River and established a fort called Fort Charles, the first English settlement on Hudson Bay. The charter granted the company and their successors the sole trade and commerce to Hudson's Bay and Strait, with territorial rights and jurisdiction over all the lands and countries on the coasts and confines of the same which were not actually possessed by the subjects of any other Christian Prince or State, to be reckoned and reputed as one of the British plantations or colonies in America, under the name of Rupert's Land.

Frobisher—1576, 1577, 1578.

One of the first voyages to the neighbourhood of Hudson Strait was that of Frobisher in 1576. He left the Thames on the 8th January with the "Gabriel," of thirty-five, the "Michael," of thirty, and a pinnace of ten tons, to find a road to Cathay. The pinnace was lost; the "Michael" got separated in a gale, and, thinking the "Gabriel" was lost also, returned home. Frobisher in the "Gabriel" sighted Greenland on the 11th of July, the North Foreland on the 21st of July, and got into Frobisher Strait during August. He arrived back in England on the 2nd of October

in the same year. Next year he came out in charge of three vessels—one the "Aid," lent by Queen Bess, of 180 tons. He left England the 29th of May, Orkneys 8th of June, got to Hall's Island in Frobisher Straits on the 17th of July, and on the 23rd took formal possession of the new land. He marched through the country with the ensign displayed, &c., piled stones on high mountains and other places in token of possession, offering thanks to God and imploring the Divine Majesty that the barbarous natives, trained up in paganism and infidelity, might be led to the knowledge of true religion and to the hope of salvation in Christ, &c. He returned to England the same fall. He went out again next year with a larger expedition, intending to found a colony. The colonists, however, refused to settle, as they found the climate too rigid. Captain Hall in 1861 and 1862 found traces of this expedition on the shores of Frobisher Inlet.

John Davis—1586.

John Davis sailed from England on the 7th of May, 1586, on his second voyage in the "Moonshine." He sailed past "Meta Incognita," which land had been so named by Frobisher. He entered Hudson Strait, and coming out again continued on down to Davis Inlet, Labrador. He again visited Cumberland Sound in 1587, thinking it the route to Cathay.

Captain Weymouth—1602.

Captain Weymouth in 1602 in the "Discovery," seventy tons, in company with the "Godspeed," fifty tons, left Orkneys on the 4th of June. On the 28th of June, in the latitude of $62^{\circ} 20'$, he descried Warwick's Foreland, and standing along the coast saw great reason to believe it was an island, and supposing it to be so he concluded that Lumley's Inlet and the next southern inlet must of necessity be one sea, and as there is a great current there setting to the west he thence inferred there might be a reasonable hope of a passage. He got to latitude $68^{\circ} 53'$, but his men refused to proceed. This was the 19th day of July. They were willing to try for a western passage in between 60° and 57° . On the 26th of July, being in $60^{\circ} 40'$, he found an inlet into which he sailed one hundred leagues west by south; that it was forty leagues broad, very little incommoded with ice. As his men were many of them sick he returned to England, believing he had found the north-west passage. Captain Luke Fox is of the opinion that it was this voyage which induced Hudson to make his discovery.

Hudson—1610.

Hudson in 1610 on his fourth voyage discovered Hudson Strait and Bay. Leaving England on the 17th of April he reached Iceland by the end of May. He left again on the 1st of June, saw all the mouth of Frobisher Strait on the 9th of June, entered Hudson Strait on the 24th of June; on the 11th of July he was off the Isles of Gods Mercie, passed through the strait and into the bay on the 3rd of August. He entered the bay by the strait between Cape Wolstenholme and Cape Digges, both of which capes he named. He seems to have had a hard struggle in the strait against ice and contrary winds. Sailing south along the eastern shore of the bay without reaching any comfortable haven, he was frozen in by the 1st of November. In the spring of 1611, his crew mutinied and Hudson with his son and seven men were cast adrift in an open boat, nothing was afterwards heard of them.

Sir Thomas Button—1612.

In 1612 Sir Thomas Button sailed from England in the beginning of May, discovered and named the Button Islands, Southampton and Mansfield Islands, reached Nelson River on the 15th of August, wintered there and returned home in 1613.

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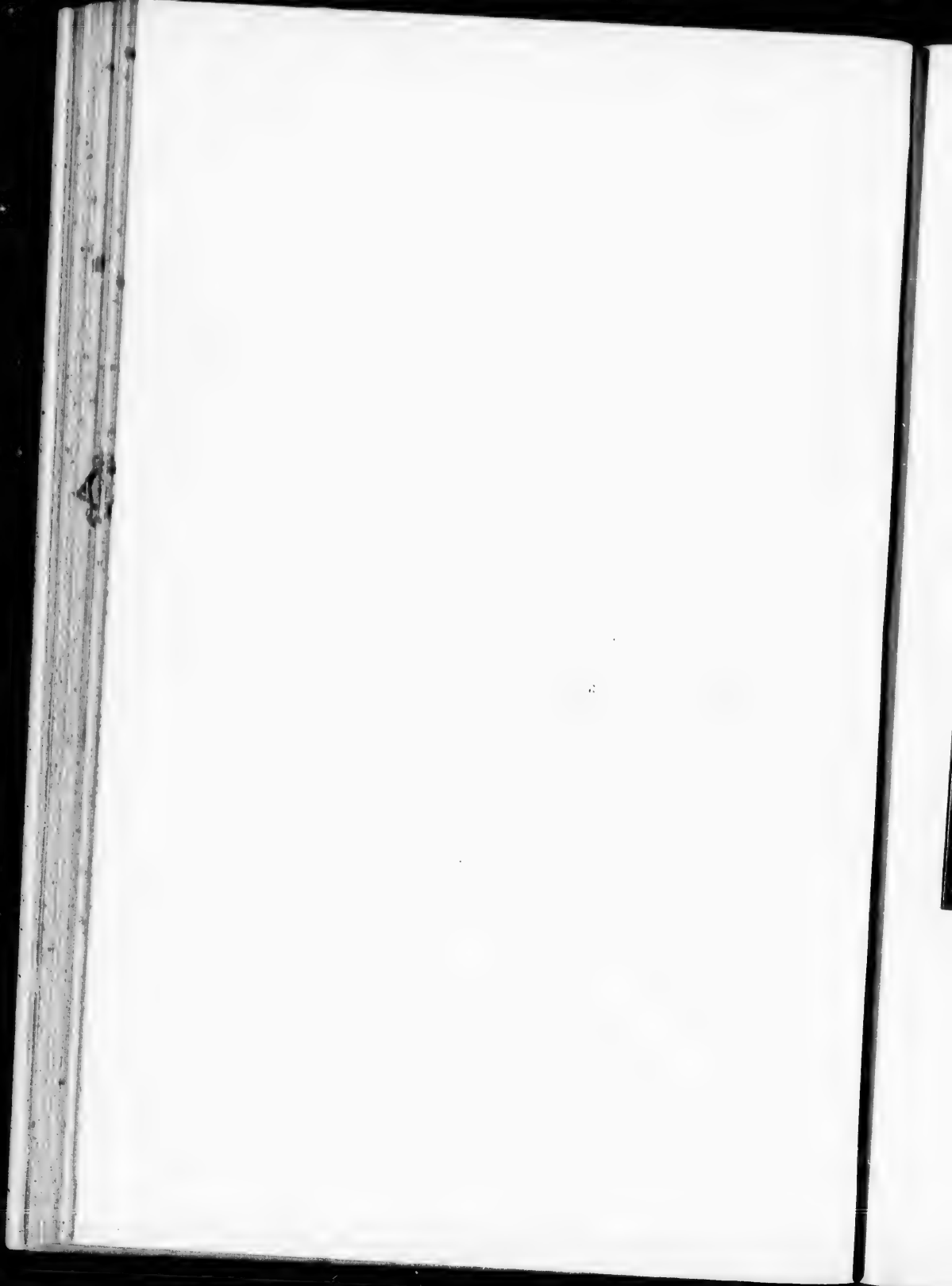


ESQUIMAUX AT DOUGLAS HARBOUR (Oct. 20).

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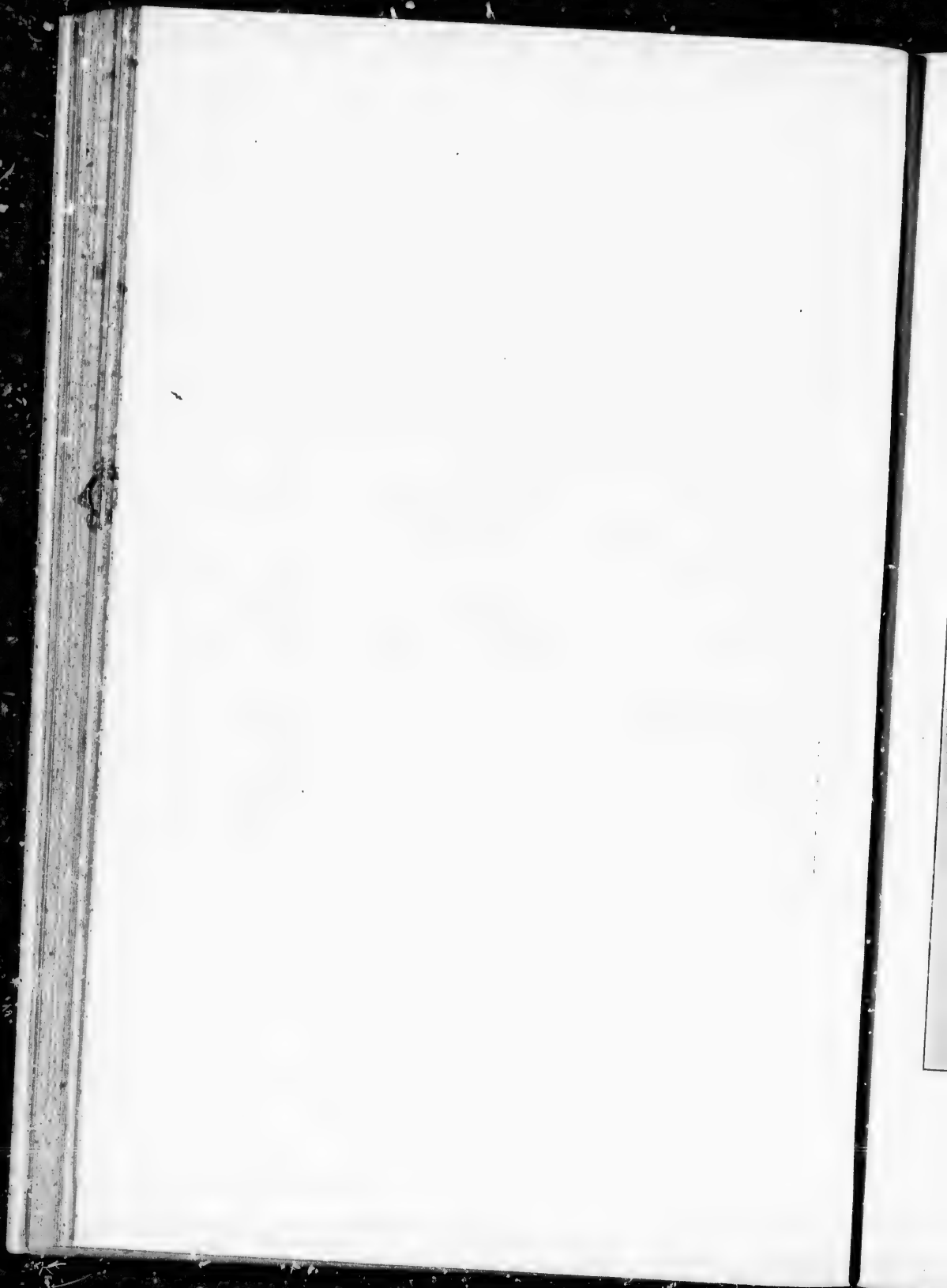


HUSBAND AND WIFE—DOUGLAS HARBOUR—MAN IN WINTER DRESS (Oct. 28).





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Gibbons—1614.

Gibbons in 1614 is also reported to have entered Hudson Bay in search of a north-west passage.

Robert Bylot—1615.

Captain Robert Bylot in 1615, in the "Discovery" of 55 tons, with William Baffin, whom he took as pilot, sailed from England on the 18th April, sighted Greenland on the 6th of May, made Resolution Island on the 27th of May, traded with savages at Savage Islands, saw the Mill Islands which he named on account of the grinding of the ice on them. On the 10th of July saw land to the west of him where he found a tide coming from the north which gave him hopes of a north-west passage; he called at Cape Comfort, and from there returned home on the 9th of September without losing a man. He says very little about ice, and seems not to have been delayed.

Hawkesbury—1616.

Captain Hawkesbury on the 10th of August, in 1616, reached Sea Horse Point. He could not find a passage beyond so he returned to England.

Luke Fox—1631.

Luke Fox in 1631 in the pinnace "Charles" of 20 tons (with twenty men, two boys and eighteen months' provision) sailed from England on the 8th May, entered Hudson Strait on the 22nd of June, passed Carey Swan's Nest, entered Sir Thomas Roe's Welcome which he named; he found fine, clear weather, an open sea, free from ice, no snow on the land. Sailing southward on the 30th of July, he named Brook Cobham; he sets down on the 3rd of August in his journal, that the further he got from Roe's Welcome, the less perceptible was the tide. He called at Nelson River on the 29th of August, where he met Captain James, he passed out of the strait in the beginning of October and arrived in the Downs on the last of the month. He never seems to have been bothered with ice and claims that the further north he got in Hudson Bay the warmer he found the weather and the less ice he saw. He was a firm believer in the north-west passage; believed it would be found up the Welcome, and in a temperate climate.

Captain James—1631.

Captain James sailed from England about the same time as Fox. He entered Hudson Strait in the middle of June, was exceedingly embarrassed with ice, of which he gives a long account; he went to the bottom of the bay; wintered at Charleton Island, where he was forced to take shelter early in October when it was beginning to snow and freeze excessively. Though the ice went out of James Bay on the 9th of June, 1632, yet the sea to the northward was full of floating ice until the 22nd of July. James sailed along the west shore to Marble Island, stood round by the main shore to Nottingham Island and being persuaded that no north-west passage was to be found, he sailed for home during the end of August, and only reached England on the 22nd of October. When James and Fox's reports or journals were published there was great doubt as to which of them was telling the truth.

Captains Knight and Barlow—1719.

Captains Knight and Barlow sailed to Hudson Bay in 1719, but we have very little record of their voyage.

Captain Middleton—1741.

In 1741 Captain Middleton entered the bay in the "Furnace," he sailed up Wager River, wintered his vessels "Furnace" and "Discovery" in Churchill River; he had them in winter quarters on the 4th September, 1741. The river was frozen up eight miles above wintering creek on the 9th October, so that people could cross on the ice. On the 13th October all the ice that lined the shore without, and for two miles up the river, was driven out of sight to sea. He got out of winter quarters early in July, and by the 12th of July was in the latitude $65^{\circ} 30'$ north and longitude $85^{\circ} 55'$ west; and in Wager River 13th July, 1742; sailed round the Welcome, discovered Frozen Straits and left for England on the 15th of August.

He left Orkneys on the 27th of June, 1741; made Cape Farewell on the 16th of July; Resolution Island on the 25th of July, and on the 29th of July had reached Cape Digges. He found the strait clear of ice; same evening—29th of July—made north end of Mansfield Island; made Carey Swan's Nest 31st of July, and decided to go and winter in Churchill. August 2—On his way to Churchill met much ice. He entered Churchill River on the 9th of August; on the 31st of August hauled his ships ashore in Wintering Creek, and had them all secure for winter on the 17th of September. On the 29th of September the river was full of ice.

He sailed from Churchill again on the 1st July, 1742, and was in the Welcome until the 15th of August, when he bore away for England. Passed Mansfield on the 20th, Cape Digges on the 21st, Resolution Island on the 26th of August, and reached Orkneys on the 15th of September. He seems to have met little ice in the strait, either going in or coming out.

Captain Coates—1727 to 1751.

Captain W. Coates' narrative from 1727 to 1751, during the time he was employed in the service of the Hudson's Bay Company.

Barrow, who edited Coates' Journal, says: "Although a century has elapsed since the Journal was penned, Coates' remarks will be found surprisingly accurate and well deserving of being perpetuated among the rare and unpublished voyages and travels which the Hakluyt Society is engaged in preserving from the ravages of time."

In treating of the voyage to Hudson's Bay, and the best method of handling a ship in the ice, Captain Coates says: "Keep well south of Cape Farewell, and carefully avoid being entangled in ice before you enter Hudson's Straits; the ice is hard, and the swell runs miles into it; tides and currents keep the ice in continual motion, make it dangerous to hazard a ship in it until you get 10 or 15 leagues into the straits. In 1727 I lost a ship near Cape Farewell by being nipped, and in 1736 I lost another during a calm, when the ice shut in on me six leagues inside Cape Resolution; the ship sank in 20 minutes.

"Keep to the north side of the straits, as the north side of the straits and bay is generally clear of ice first, due to the prevalence of the northerly winds and a draining current always to the southward; although the winds sometimes produce a contrary effect.

"You should sail from England to be off the mouth of the straits by the 6th of July, a few days sooner or later as the season will admit. But take notice that on the 3rd of July, 1736, the ice was so large in the entrance of the straits that, being inclosed, we had our ship crushed to pieces; and in 1739 we attempted to enter the straits six times between the 1st and the 12th of July, and could not effect it, so compact and close a body of ice lay across the entrance, which obliged us to stand out to sea. I remember once we got in by the 26th of June, and got up with great labour about 60 leagues; but then we found such banks and walls of ice from side to side that we did little or nothing until the 20th of July. And, therefore, you see 'tis to little purpose to be there sooner, and your hazard is much greater, being the ice is more compact, much larger, and not so mashed and shattered; and 'tis incredible what an alteration the spring tides in the beginning of July make amongst the ice in the mouth of the straits, and what immense

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bodies it will shatter and break in pieces, which before was dreadful to look at when agitated and put in motion by those furious tides, which are so distracted and cut by those heavy rands of ice which makes them boil up in eddies and whirlpools in the most amazing manner, which you are particularly and carefully to attend to; and if you are doubtful of being entangled before you get in at least 15 leagues and more, especially on the approach of the springs, you are to forbear and make it a rule to stand out to sea clear of that indraught.

"Further up the straits we find the ice not so rude, without you are near the shore or near the isles of ice, until you are half way up the straits and beyond that to Cape Digges in the second Narrows upon the turns of the tides, and more especially of the spring tides everywhere the ice is rude and troublesome and very dangerous. The ice may not improperly be divided into three species. First—Is those isles of ice are such immense bodies, are so deep immersed in the water below the current of the tides, are so fixed like land without motion or what is scarce sensible. Second—It is what is called large heavy solid ice, and is that species we most dread to fall amongst; this ice lies very deep in the water and feels the full force and power of the tides; these plough and smash the ice in so amazing a manner as if God had endowed them with a furious spirit of perdition and these are so rent and shattered of themselves when they are hurled against those isles of ice, or one another, as if they strove which should be first dissolved. Third—The small ice is as it were the sport of the other two species of ice, and is much more effected by the wind than by the tides, and this species is by much the greater quantity, in and amongst this we always endeavour to shelter our ships, where we lie easy and quiet and safe and undisturbed, but only when we drive near a jostling, clashing and running one against another, as I have before mentioned. This is evident whether you see them or not, as we have an abundance of dark, foggy weather. I must not omit to remark that although the ice is as it were the sport of the tides, yet the tides are violently effected by those thick, heavy rands of ice, which distract them in all directions, and in all gradations according to the bulk and depth they are immersed.

"These as before plough through the small ice with astonishing force but are overcome by the superior quantity of small ice. In all these encounters there is great danger to be caught near the borders where the undertow is so powerful like falling athwart a tire of ships in a strong tide way. No power can remove until the return of a contrary tide, and so you lie exposed to the crush and shock of all that comes; these we call escapes with some propriety.

"What I have said hitherto belongs to the ice in the straits where the tides are powerful everywhere, but the ice in the bay, until you are near the land, is very still and is in a manner moved by the winds only, which makes us take any method, or sail almost any distance rather than fasten in the bay ice. And as a momento never enter a body of ice in the night, nor in the fog, when there is any hazard of being inclosed, nor before you have circumscribed it as much as possible; nor imagine 'tis lost time to take two looks before you resolve once. I have constantly experienced this, which has more than once given me considerable advantage over other ships; in short, wherever I slighted this precaution, I generally was punished in the neglect of it before I got distangled.

"As it is very hazardous to enter the straits before the beginning of July for ice, so it is dangerous to be in that bay after the middle of September. The gales of wind and snow set in for a continuance with very short calm intervals; the severe frosts are such that you cannot work the ship; possibly as the frosts prevail the winds decrease, but to what purpose when the blocks are locks and ropes are bolts and sails can neither be taken in or left out, is surely the last extremity. The new ice near the shores and rivers and the wash of the sea stick to your ship and ropes like bird lime, caud in your sails like pitch, and so all operations by water ceases, in the northern part of the bay first and so southward soon after. The winds on the land are variable, and you have short intervals of fine weather in the day time until the end of October, but those violent gales of frost and snow are so frequent that all our craft are put into winter quarters when the rivers are covered with ice and the shores are lined to a great

distance, and water disappears, the land clothed with snow, then prevails those violent piercing winds, which no creature can face for a continuance (except some short intervals). These terrible snow drifts and dark condensed fogs are hardly to be guarded against."

Ellis, Moore and Smith—1746.

The "Dobbs Galley," 180 tons, and "California," 140 tons, William Moore in command of "Dobbs Galley," Francis Smith of "California." Henry Ellis went with them as agent of those who fitted out the expedition. He was a firm believer in the north-west passage. A lengthy code of instructions was given for the guidance of the two commanders. They left England on the 12th of June, 1746, in company with the Hudson's Bay Company's ships. On the 5th of July they began to meet the mountains of ice always found off the mouth of the strait. They reached Resolution Island on the 8th of July, and were nearly wrecked on Resolution Island during a fog. Met with very little ice to Upper Savage Islands. On the 13th of July fell in with an abundance of low ice, five to ten fathoms thick. Were abreast Cape Charles on the 17th of July, much incommoded with ice, and on the 30th of July were abreast of Salisbury Island. Passed Cape Digges on the 2nd of August, Mansfield Island on the 4th of August, and on the 11th of August made the Welcome. Nothing was done that season. They went into winter quarters in the end of August in Hayes River. Winter began the end of September. Wintering Creek froze by the 8th of October and by the 31st of October Hayes River was frozen over hard. Got out of winter quarters and sailed north the 1st of July, 1747; were in the Welcome up to the 19th of August; passed Mansfield Island on the 28th of August, bound home; entered Hudson Strait on the 29th of August; had a good deal of difficulty there on account of fog and ice; got out of the strait on the 9th of September, and reached England the 28th of September, 1747. Henry Ellis was a firm believer in the north-west passage even after his failure to find it in this voyage.

Franklin and Back—1819.

On the 23rd of May, 1819, Franklin and Back left England on board the Hudson's Bay Company's ship "Prince of Wales" on a land expedition to explore the coast east of the Coppermine River. On the 4th of August they fell in with their first icebergs, and reached York on the 30th of August.

Parry—1821.

Captain Parry on his second voyage—Parry in the "Fury," Lyon in the "Hecla"—left England on the 8th of May, 1821. First met ice in the middle of June (17), latitude 60° 53', and longitude 61° 39'. Sighted Resolution Island on the 19th of June; beset for a week under Resolution Island about the 16th of July. On the 21st of July off the Lower Savages they met with three of the Hudson's Bay Company's ships which had left England twenty days after them. Passed Salisbury and Nottingham Islands on the 13th of August, Frozen Straits (of Middleton) on the 20th of August, Repulse Bay on the 22nd of August, and laid up their ships for the winter in Lyon Inlet on the 6th of October. They had to cut a channel through one-half mile of shore ice to get their vessels into the inlet. They began to cut their way out on the 21st of May, 1822. They found the ice to average four feet thick, though in some places it was twelve feet thick. Had their channel cut out by the 18th of June, 1822; put to sea on the 2nd of July; entered Fury and Hecla Straits on the 26th of August; straits blocked with flat ice. In winter quarters again about the 4th of September near Igloolik; were in winter quarters 319 days; got out on the 9th of August, 1823; they were carried in drift ice until the 12th of September in Fox Channel; the ships were beset and in great danger for thirty-five days; only got out of Hudson Strait on the 23rd of September, and reached Scotland on the 10th of October.

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Captain Lyon—1824.

In 1824 Captain Lyon in the "Griper" left England on the 20th June, rounded Southampton Island on the 30th of August and stood up for Roe's Welcome. He entered Wager Inlet on the 12th of September, but his ship was crippled and leaking so he returned home directly.

Captain Back—1836.

Captain Back left England in the "Terror" on the 14th of June, 1836. By the first of August he was struggling with ice floes off Resolution Island; on the 23rd he sighted Baffin's Island, and began to work his way through a sea of ice to Southampton Island, thence he proceeded towards Repulse Bay where he intended to winter, but late in September a violent storm drove him back past Cape Comfort, when the "Terror" was fairly ice bound, resting on the solid ice as on a cradle, and driven to and fro as the fast frozen plain moved with the currents and winds. In this position Captain Back and his crew passed the winter. Towards the close of February the floe was rent asunder, with a commotion which threatened to crush the ship; the broken masses of ice drove backwards and forwards, grinding and crushing together with the most appalling sounds, now lifting the ship quite out of the water, now dashing against her sides with a force which made her reel from stem to stern. These conditions continued up to the 16th March, 1837, when they reached a crisis, a sudden coming together of the ice raised the ship entirely on the floe; "scarcely ten minutes," says Back, "were left us for the expression of our astonishment," that anything of human build could outlive such assaults, when another equally violent rush succeeded, and on its way towards the starboard quarter threw up a rolling wave thirty feet high, crowned by a blue square mass of many tons, resembling the entire "side of a house, which after hanging for sometime in doubtful poise on the ridge, at length fell with a crash into the hollow, in which as in a cavern the after part of the ship seemed imbedded. It was indeed an awful crisis rendered more frightful from the mistiness of the night and dimness of the moon."

During all this period of disaster, the unfortunate "Terror" was driven to and fro over a range of from twenty-six to forty-eight miles north-west of Seahorse Point, but after the 16th of March she drifted off from the shore and set towards the south-east. Another month passed and still the ice held her in its grip, then it parted for a while and Back seized the opportunity to refit his shattered vessel. The ice closed in again and continued packed from the 7th of May until the 2nd of June, when it finally broke up without any commotion. The ship's hull was caulked and coated with tar and a channel having been cut through the broken floe to the open sea the "Terror" finally regained her liberty near Cape Charles on the 13th of July. The ship was broken, leaky and riddled, there was nothing for us but to try and get her home, when she reached the north-west coast of Ireland she was actually sinking by the head, so that it was found necessary to run her ashore in Lough Swilly on the 3rd of September. Had she been three hours more at sea she would have foundered.

Dr. Rae—1846.

In 1846 Dr. Rae left Churchill with a boat expedition on the 5th of July. He met ice off Cape Fullerton on the 15th of July; reached the mouth of Wager Inlet on the 22nd of July, and got into Repulse Bay on the 24th of July, and Committee Bay by the 2nd of August, where he went into winter quarters on the 2nd of September. He made a land voyage across the isthmus to the Gulf of Boothia, during April, 1847; got back to his quarters by the 5th of May, and on the 13th of May again left to survey Melville Peninsula. He returned to his quarters on the 9th of June, remained waiting for the ice to break up until the 12th of August, when he left to return to Churchill, reaching there on the 31st of August and York Factory on the 6th of September, 1847.

STATEMENT OF CAPTAIN THOMAS MCKENZIE, OF NEW BEDFORD.

20th December, 1897.

I am captain of the whaling bark "Platina"; I am 45 years of age; have been whaling since 1875, but I never went north on this side before 1896, when I went up in the "Platina." I left here the 6th day of July, 1896; I got to the strait on the 23rd of July, and I got to Whale Point at the mouth of the Welcome on the 14th of August; it was not ice that delayed me, but head wind. I met my first field ice at the Lower Savages. Outside the strait I saw lots of bergs, but no field ice. The ice I met off the Lower Savages was open so that I could work through. I found this same kind of ice all the way to Charles Island; I had no ice after that to the Welcome. The ice I met in the straits was well eaten up, honeycombed, any of our steamers would have gone through it all right. The ice I met coming out was bay ice; ice coming out of the bay; the Baffin's Bay ice never goes any distance into the strait, though bergs may sometimes be driven in. From Whale Point I went up to Repulse Bay; I got there on the 6th of August. It is narrow up there and the tide is bad; I tried to get through Frozen Straits to Fox Channel, but I never got a chance; it was always full of ice coming from the north. This ice is set off the north-western shore of Southampton Island and forcing up blocks the strait. The current comes into Fox Channel from the north by way of Pond's Bay, and from the west by Fury and Hecla Straits. On the east shore of Fox Channel there is generally open water in summer, on the west shore the ice lies off about five miles, that ice is passing to the southward all the time out of Fox Channel in to Hudson Strait; this is field ice, some of it from twenty to thirty feet thick, this is mostly all rafted ice, but in Fox Channel and in Frozen Straits we do see ice not rafted which is twenty to thirty feet thick. I think this ice comes through Fury and Hecla Straits. I never saw a big berg in the Welcome or in Fox Channel, and I never saw a big berg above Big Island. We see small bergs say from thirty to fifty feet out of water and I think they break off the land there. The ice from the Welcome works to the southward down the western shore of Hudson Bay, it is eventually carried across the bay and goes out by the islands and Cape Digges. When Repulse Bay ice first breaks up about from the 1st to the 10th of August, it generally goes out by Frozen Straits. Our whalers bound for the Welcome try to leave here about the 15th of June, so as to be off the mouth of Hudson Strait about the 15th of July. They have found by experience that generally they can not get in before that date. It is useless to go earlier. I have looked over several logs of vessels, and I have never found one that did anything before that date, they always found ice even at the date mentioned 15th of July; and they have generally got through the strait and into the bay from the 5th to the 15th of August. It would be an object with them to get in earlier for the whaling; the whaling begins on the west side of Southampton Island early in August, off Whale Point or Yellow Bluff from the end of August to 10th September, after that to the south and west of Cape Fullerton, until the 20th September, then we have to go into winter quarters on the 20th of September. The whalers winter now, either at Depot Island or at Fullerton. We go by our own head and by what we see, rather than by any chart, the charts are all wrong, and there are reefs and rocks along the shore in the Welcome that are none of them down. Whale Point is about right. We always try in our sailing ships to get out of the Welcome homeward bound from the 1st to the 15th of September, that is leaving Whale Point at the mouth of the Welcome. This year, 1897, I left on the 19th of September and saw no ice. Fisher Straits I found blocked, and I came south of Coates' Island, coming that way I saw no ice, I saw a few bergs off the mouth of the straits, but no field ice. I got out clear of the straits on the last day of September, and had a heavy long run home, gales from west and north-west. I got home on the 23rd of October. We do no whaling on our way home, but get out as soon as we can, once we leave. We generally begin to have stormy weather, thick snowstorms as soon as September sets in. For all that the Fox Channel ice may swing down past Salisbury and Nottingham islands to the Labrador shore in the fall, yet there will generally be found an open channel

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along by Cape Digges. We are more apt to be jammed in the fall at Charles Island; one of our whalers the "Desdemona" has gone in between Charles Island and Labrador and found a good channel. There is a rock off Cape Kendall, the land just in sight, in the mouth of the Welcome, it will break in a sea, but it is not on any chart. The west entrance of York Bay is in the Welcome instead of being round where the chart gives it. I do not think you are going to get through Hudson Strait into the bay, even with suitable steamers before the 15th or 20th of July. The ice in the fall is not drove together as it is in the spring; it is in long tongues, and you could work through it with a steamer. Owing to the risks of navigation from thick weather and snowstorms I would not advise risking coming out of the bay after the 10th to the 15th of October, the weather is too bad. Late in the fall you can never depend on seeing land for more than two or three hours at a time. As soon as it is through snowing from one quarter, it will breeze up from another and snow again, this is in the strait. Up in the Welcome I had no snow in June, July or August. Snow begins with September and we have it from that out, but the weather is not as bad inside as as it is coming through the strait. When going into the strait we keep under Resolution Island, but you must look out or you will be carried out again between the Lower Savages, the main land of Baffin, and Resolution Island. In coming out, I consider the worst part is from Mansfield to Charles Island; it is bad there also in going in, but going in the ice would be the worst from Resolution to Charles Island. I think, and the natives say, that the whales—bowheads—come in the strait early in the spring along the south shore. We never find whales in Fox Channel, but in the mouth of the Welcome and in Repulse Bay; I never saw a whale in the strait. I never got a cod or a halibut in the bay and I never knew any one that did. At Marble Island we get a fish we call the toad fish, but we do not eat it; it will weigh four or five pounds. We get trout and salmon trout in the ponds and lakes; the salmon trout has the trout spots, but they are large, and look like salmon; the trout are like our own trout. The big ones—the salmon trout—come out into the salt water from the fresh water in the spring, and go in again in the fall. We find a few walrus, white whale and seals in the Welcome, and the ougug, which is between a walrus and a seal. I never saw a narwhal there. There are plenty of deer at Repulse Bay, no bears to speak of, few foxes; for musk ox you have to go back inland, up Wager River. We have given up Marble Island as a wintering place, because it is too far off the whaling ground. Whales are getting scarcer every year. Oil is worth here about 34 cents a gallon, and bone about \$4 a pound. Our whales would average seven to nine feet bone; 12 feet 3 inches bone is as good as you get; one was taken in the Welcome seven or eight years ago which made in one head 3,300 pounds. We employ natives to hunt for us in the winter to get fresh deer meat. We find the natives very good people; they will do anything for us they can. We meet different tribes in Repulse Bay. The Northern tribe, who come from Pond's Bay, are not as honest as the others.

The opinions I have given in the above statement, which has been read over to me, are those that I have always heard expressed by the whaling captains; they are certainly those which I hold myself.

THOMAS McKENZIE.

BEDFORD, 22nd December, 1897.

STATEMENT OF CAPTAIN E. B. FISHER, OF EAST FALMOUTH.

December 21st, 1897.

I am aged sixty-four, and have visited Hudson Strait and Bay regularly since 1864—except in two voyages—before I took charge, having commanded whaling vessels. The practice is to sail from New Bedford anywhere from 1st of May to the middle

of June. The object is to reach the mouth of the strait about the 1st of July. We do no whaling until we get into the bay. The earliest date on which I have entered the strait was the 1st of July. That year I got into the bay on the 19th of July. I had no great difficulty with ice that year. I went in between Mill Island and Salisbury. It was all full of ice that year along the Cape Digges shore. In all my experience of the strait, I have never found the ice alike in any two seasons. There is no regularity in the movements of the ice, it all depends on the winds. One year I entered the strait the 1st of August, and I got into the bay on the 9th of August, and saw no ice at all. I have taken the ice off Resolution Island on the 4th of July and not got above Big Island at North Bluff before the end of July and not into the bay before the middle of August. That season, 1874, the strait was practically full of ice from the mouth up to Big Island and from Big Island into the bay the ice was more open. My practice going into the bay is to work up along the north side of the strait where I find a favourable current. I never saw Davis Strait ice above Big Island; above Big Island I would expect to find only the bay ice. The thickness of the ice met with varies greatly, some of it draws fifty feet, some only six feet. Above Big Island and in that vicinity I have found pans of ice of many acres in extent. This ice has not come from outside or it would be broken up. This thick ice is rafted; it looks as though it had been subject to pressure and had thus been piled up. Large bergs from outside never pass Charles Island. I have seen small bergs above that but never any large ones. I have never seen any bergs in the Welcome or Fox Channel, there is not water enough for them, and they are not made up there. I gave Fisher Straits their name. In going into the Welcome I usually strike Cape Pembroke, going south of Nottingham, and then go through Fisher Straits north of Coates. In the early summer I have generally found these straits clear of ice. Our whaling is done from Marble Island towards the Welcome, and the sooner we get in there the better. The ice from the Welcome goes down into the bay and there decays. I have known the Welcome to be closed with ice till the end of August; this with Fox Channel ice that came through Frozen Straits. This ice came in after the Welcome ice had gone out. I have never attempted to go from the Welcome into Fox Channel with a sailing ship. There is no use trying, as the current is too strong—a five or six knot current. The current flows both ways into Wager River, the ebb goes north and the flood comes south. I have never been further into Fox Channel than the south-west cape, Fisher's Cape, near the Three Sisters Islands. Repulse Bay is fed with whales from Fox Channel, and the same in York Bay. Whales go in by Hudson Strait; years ago a lot of whaling used to be done off Resolution Island in May. They go in in May. Whaling begins off the mouth of the Welcome in May and June, and if whalers could get in through the strait early enough they would not winter in the north. They winter north because they cannot get through the straits early enough to begin whaling in time. I have never caught bottom fish, cod or halibut in the strait or bay. I have seen tommy cods in the ice. Salmon and trout we get from the natives. Within my recollection six or eight whaling vessels have been lost up north, two in the strait going in, the "Isabella," one other, a new London vessel, the "Pioneer;" this last was a steamer. Both these vessels were crushed in the ice nip; both were lost just above Big Island on their way in, one in July, the other in August. The other vessels were lost—three at Marble Island parted their chains and went ashore, and the other two or three lost in the Welcome on reefs. The last one was lost a year ago last fall. She went on a reef above Wager River. The man who was captain on her is now frozen in on one of the Arctic whalers on the west coast. The whaling is done; we are sinking money every year. The whales are easily disturbed, and they leave the grounds; they are also being killed faster than they increase. We used to get some very large whales in the Welcome, but not now; this was thirty years ago. I have always made it a practice to leave the Welcome to come home from the 5th to the 10th of September, and it usually takes a week to ten days to work out of Hudson Strait. I would come through Fisher Straits and shape a course from Cape Pembroke to North Bluff, keeping about twenty miles off shore from North Bluff, coming down past the Button Islands. The last time I came out in company with one of the Hudson Bay ships. I have usually got out without any trouble, but one year I found the ice all from the north down to within

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five miles of Mansfield Island. This ice was coming south from Fox Channel. I managed to get through between the land and ice. I had left the 11th of September, and it was about the 16th of September when I got to Mansfield Island. I had come up Fisher Straits and met the ice close to Cape Pembroke. From Mansfield to the east of Nottingham was clear, and I had no more trouble. Some years before this Captain Jacobs of the Hudson's Bay Company's ship was blocked going out and could not get through; he had to winter in the bay. Captain Jacobs would be coming out later than I did. I have wintered in Repulse Bay, and at Marble Island, and at Depot Island, to the westward of Cape Fullerton. When wintering north we try to get into winter quarters about the end of September. We must do so early, as such a vapour or steam rises off the water that we can get no observation and can see nothing; we would get blown off, and owing to the uncertainty of the compass could not tell where we were. The ice begins to make hard about the 1st of November, and by the middle of November we are finally frozen up and in a safe harbour we will not break up again. Salt water ice will make in the one winter about five and one-half feet. We usually begin to cut out trenches about a couple of feet deep early in the spring, say 1st of April—this is where we intend to saw later on. This helps to make the ice porous, and gives us less thickness to saw. We scatter salt in the trenches. This cuts down with the help of the sun. Then we begin sawing out the last of May or the first of June. This will depend on the pack ice. We wait till this has gone. We are finally sawed out the last of June, and go to sea at once. I have been kept in Marble Island until the last of July. When I first went whaling ten or a dozen vessels would winter up there; this was thirty years ago. Now not over two the last ten years, and this only every other year. I have taken the ice off the mouth of the strait seventy-five to one hundred miles off shore. This is heavy, rugged ice—Davis Strait ice. Never find much current or nipping in this ice. Off Resolution Island on the spring tides in these tide rips I would not like to be caught. No wood or iron could ever stand when heavy ice comes together. Not then much danger of nipping until off Big Island, at what is the narrows of the strait. Beyond that I would not consider it dangerous, though you must always keep a good look out, as it is nowhere surveyed. The first smooth white pan ice you meet coming out of the strait is made in the bay and about Nottingham and the other islands, and the next ice you meet is that heavy, rugged, solid ice which comes down out of Fox Channel. It is deeper ice, more broken, and not in such large pans; it is deep away under water as far as you can see.

The navigable season in Hudson Strait will vary. I would say from three months to three and a half is about the time for which the strait could be safely navigated by steamers for commercial purposes.

The above statement having been read over to me, I approve of and have signed.

E. B. FISHER.

FALMOUTH, 22nd December, 1897.

STATEMENT OF CAPTAIN JOHN SPICER, OF GROTON.

23rd December, 1897.

I am aged 62, I first went whaling in 1849, this was on Behring Sea side. In 1856 and 1857 I was at Spitzbergen, and in March, 1859, I first went to Cumberland Gulf. I had been before that to East Greenland and Iceland. In 1863 I sailed in the schooner "Active" for the north. I sailed from here in June about the 20th, not positive as to the date. I thought I would go through the Straits of Belle Isle, in those straits I met ice, proceeded through this, on July the 4th, was to the east of Cape Charles in a hole of water some 25 miles across, without any ice in it, and no chance

for 20 days to enter the ice on any side; saw several vessels in the ice pack unable to stir; about the 20th of July we had a heavy gale, this slackened the ice so that I got to the land of Labrador about Venison Tickle, I was there a few days. I found several vessels had been crushed in the ice, fell in with an old pilot who I employed to pilot me among the islands. Kept on north among the islands as the ice would slack, and I could work along; when north of Nain picked up two native mail carriers who were bound to Okkak, having a heavy breeze and squally among the islands sprung my mainmast head and had to go into Okkak and lie five days to repair. Proceeded north again working along the land through and inside the ice pack. When abreast of Cape Chudleigh, on the morning of the 12th August, got free from the ice, whilst scanning the horizon with my glass, discovered two boat masts and boats and men upon the ice to the east, distant six miles. I knew there must have been some wreck, proceeded to rescue people, found them to be two boat crews from barque "George Henry" of this port which had been lost about the middle of July (17th). She had been crushed in ice on the middle Savage Islands; ascertained that three other boats crews had been separated from them in a gale. Consulted with them; I decided to see if I could find the other boats, this was at 7.30 a.m.; proceeded east under double reefed sail, keeping good lookout aloft; at 11 a.m. thought I must be to eastward of lost boats and while debating whether we had passed them I made out their signals on my quarter; tacked ship and proceeded to them through the scattered ice; in taking them on board we saved the people but smashed all the boats. Hove to for 16 hours in heavy south-east gale and decided to proceed to where they had left the wreck. They had left her fast to the land and had landed a good part of their provisions. I wanted the provisions for the 34 extra hands I had now on board; got there evening of the 15th of August, found that the vessel had been released from the shore and had disappeared, the provisions that they had landed had been sacked, found only a few sails. Decided then to proceed to Hudson Bay where we knew there were several American ships that would be bound home and could take the wrecked crew. On the morning of the 17th of August proceeded to sea to west, entered the ice before coming to Upper Savage Islands, about 50 miles off; ice being there heavy but slack, set solid to the south but more open water on the north side, having strong breeze, continued working through the ice to the west until about 30 miles west of North Bluff. In the morning saw a ship to the south-west of me trying to work through the ice to the west, set my colours and worked towards her, seeing open water about Charles Island. She answered with her colours, when I got within three miles of her she set all sail and left me, when I got in open water I made chase, when I overtook her I found her to be the "Prince Arthur" of Hudson's Bay Company. I asked her if she had been to the Lower Savages, or where the provisions were and if they had seen any wreck; they said "No." I asked them if they had seen any other vessel; they said they had seen the ship "Queen" to the north of them about Savage Islands. I told them I had a shipwrecked crew on board who were looking for their provisions. He told me if they were English seamen he would relieve me. I declined as they were Americans. I kept along the south edge of the pack till I passed Nottingham Island, when I saw no more ice. It was the 23rd of August when I reached Marble Island. At Marble Island I fell in with the other ships, disposed of part of the crew; saw the ship "William Thompson" of New Bedford who had got into the bay a few days previous, having been in the ice several weeks jammed in the straits on to the north shore, and had escaped with a little damage. The brig "Pavilion" was also jammed ashore and lost off Crow Head on the reefs, 70 miles west of North Bluff. Her crew, two boats of them, took the coast down and one was lost with all hands crossing from Resolution to Cape Chudleigh. The other two boats got on the Labrador and found about Cape Muford another Hudson's Bay ship which was a chartered vessel set ashore by the ice. They got her off and went to St. John's, Nfld., in her. After disposing of the crew, I went on my voyage, working into Roe's Welcome. I secured a cargo of oil and bone, and on the 23rd of September started for home, against the advice of all the other masters, as the year before the bark "Black Eagle" had started for New Bedford the 19th of September, but when coming to Nottingham Island fell in with the pack from Fox Channel, and after a very boisterous time could not get through, and was forced to turn back and winter near the

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depot; but I proceeded with a south-west gale, when south of Southampton and near Mansfield. I hove to a day and a night in a snowstorm, ice freezing solid from the boats to the rail of the ship. On the morning of the 25th of September, came up with the pack to the west of Nottingham, knowing the gale had been to the south of west, thought there must be a lead on the south shore and followed the pack on its south edge to the south of Charles Island and having about seven miles of working ice along the south shore went to the east and when abreast of North Bluff seemed to get out of the pack; saw but a few bergs until outside of Cape Chudleigh, when I followed the land down and saw the last of the pack off Cape Mugford. I only got the ice off my vessel on the 7th of October, when down off Hopedale.

It is an object with whalers to get to the whaling grounds in the Welcome as early as they can. To be there early they have to winter there. They have found by years of experience that they cannot get in early enough from the Atlantic.

I wintered at Spicer's Harbour with the "Nile" and schooner "Era" the winter of 1877 and 1878. We left New London in July, 1877, reached the strait about the 3rd of August; saw some scattered pack ice along Ungava Bay and Green Island. I was exploring that trip. I went up to Spicer's Harbour and on to King's Cape, where I found some natives; took them on board to show me Akolear, a place where the natives said there were always whales. I went back to Akolear, which is now called Spicer's Harbour. I cruised about there for a month, not having met my consort; and as the Esquimaux wanted to get back, and told me there were whales up about King's Cape at that time of the year—in the fall; so back I went to King's Cape, met my consort after looking over the country a few days; started back in October. I went to winter quarters at Spicer's Harbour. We froze in about the 20th of October. The 10th of November the Fox Channel pack was down across the front and as far out as you could see, and continued all winter setting to the south and east, at times with north-east; had open water along the shore. In May and first part of June, when I was looking for whales, the pack was closed in the whole time. The 22nd of June, the pack being slack and some open water and having seen no whales, decided to try and get into the bay. We got under way, both ships, and started; having free wind and working ice, we attempted to go through Fisher Strait. I did not fetch in, the other vessel did; so went around Southampton Island, continuing in the ice until the 2nd of July, when I got out of the pack up by Cape Kendall on Southampton Island, where I got four whales. I went up the Welcome and to the head of Wager River and back to the west shore of the Welcome. Finding no whales, decided to try Frozen Straits to go into Fox Channel; was in ice for a week to get passage into Fox Channel, but could not do it on account of ice pack. I returned back to Spicer's Harbour, took a look at the place, and went around to Cumberland Sound; saw my stations there, and then came down to New Gummiute; captured a big whale and left for home the 3rd of November, and saw no ice coming home.

In 1879, 24th June, sailed again to Hudson Strait in the "Era" (she is wintering in the Welcome this year); called at St. John's, Nfld., 5th July; called at New Gummiute 16th July, where I engaged two boat crews of natives; on the 19th of July left for Spicer's Harbour; saw some ice off Resolution Island. On the 20th of July passed south of Resolution; saw loose ice to the south and scattering ice all along the south side of the strait, and a few bergs, until the 23rd of July, when I came to anchor at Spicer's Harbour. Left Spicer's Harbour 31st of July for Fox Channel; on 4th August fell in with ice west of King's Cape, and worked to the north through the ice. The Fox Channel ice is heavier, rafted more, and has more sand on it than the bay ice. Some of it is from 10 to 15 feet out of water; is in moderate sized pans, though early in season is larger. On the 7th of August was beset; what I took to be water ahead turned out to be reefs and lowland, now called Spicer's Island, hardly seen from decks at high water. On the ebb the ice was setting east north-east, and to south-west on the flood, at about three miles per hour, and continually drawing us nearer the reefs. This made me believe there was a channel through from Davis Straits by way of Home Bay. I drifted in the ice back and forth. On the 14th of August, having got 12 miles south of Spicer's Island, found the current setting east south-east. Ice very heavy on the 18th of August; at 7 p.m. got into clear water about 35 miles south of Spicer's Island, and proceeded down to King's Cape, with the Fox Channel pack to the west of me.

I do not think that much ice comes in to Fox Channel through Fury and Hecla Straits. Nothing is known of the north-east part of Fox Channel. There are three lakes south of Lake Kennedy, and these empty at a place about seventy miles north of Spicer's Harbour. The salmon there are as big as young seals. The natives go from the straits up into these lakes in their kyacks. I went up with my dog teams in winter, and saw the water holes in the ice. Lake Kennedy besides discharging into Fox Channel has also an outlet into the head of Frobisher Bay.

On the 23rd of August saw the land at Cape Fisher, or Southampton, distant about thirty miles; ice all around to the west or north. The 25th of August worked down south-west of Mill Island, could not get any further; gave up trying to get into Hudson Bay and Fox Channel for this season. Kept away for Spicer's Harbour; called there for two days, followed back inside of Big Island and followed along; saw a few pieces of scattered ice between there and Resolution Island. I had left Spicer's Harbour the 3rd of September and passed Resolution on the north by the narrow channel into Frobisher Bay on the 13th of September; saw ice in Frobisher Sound, a pack often holds in there, this is Davis Straits ice; anchored in New Gummiute Bay 15th September. Kept on whaling there until the 4th of November. I was stowing down my last oil on that date when the Davis Straits ice closed down on that shore and shut me in for the winter, and it never let me out until the 18th day of next August, 1880. When I got outside the pack found the "Delia Hodgkiss" schooner which had been trying to get in to the land but had given up, and I proceeded to Spicer's Harbour for my two boats crews that I had left whaling there, passing south of Resolution on the 19th August, seeing loose heavy ice in big sheets all the way to North Bluff but had no difficulty working through it. On the 20th of August Cape Pest bore north true, plenty heavy ice and bergs, but scattered. Arrived on the evening of the 24th at Spicer's Harbour, found some one had been there and stole my bone, my crew were inshore hunting. I had been reported lost as they had not heard from me since the last fall. Left again the 31st of August, came out of strait on the 7th of September; wind north-west on the 8th September; came up to the pack, (had not much ice coming out through the strait) off New Gummiute, got in and remained whaling there until the 31st of October when I left for home, I saw no ice coming back.

If I were going up for Hudson Strait to-day I should keep well off shore till I got abreast of the strait in the latitude of Resolution Island, when I would head in, I would expect to meet the ice about sixty miles off. I would meet Davis Straits ice, heavy pack ice with bergs through it. This Davis Straits ice may be driven up to Big Island. I have never seen bergs beyond this, if it did come that far it would meet the other ice coming out, only continuous strong east wind would drive it up there. I have made three other trips through besides these mentioned. In 1885 I did not go myself but sent Captain Clisby to relieve my station in the "Era." He left here about the end of June, he was nearly a month off the mouth of the strait, and was another month getting up to Spicer's Harbour, being in ice all the time, he got shoved ashore but got off, he only got to Spicer's Harbour the end of August. He found the "Isabella's" crew there. She had been crushed in the ice about twenty-five miles off shore, off the harbour. The crew had managed to land there over the ice on foot having lost their boats; the delay of taking this crew caused him to be so late that he was caught at New Gummiute in October, and could not get out on account of the Davis Straits ice coming down, he had to winter there with both crews. He got out the 7th of August next year and came to St. John's being short of food. If I were going to the north I would go in June and feel pretty sure that with a steamer I would find a passage along the board ice on the spring tides, before the shore ice had come out. I would do this with a steam whaler not with an ordinary freight steamer of iron. I would keep the north shore up to Big Island, then if there had not been strong northerly winds I would seek across to Charles Island.

As to the navigation of Hudson Strait for commercial purposes it is a very uncertain proposition, there are years when with care you could safely navigate in July, August and September, there are other years when ice will be met with every month. You will have snowstorms earlier in Hudson Strait in September than you do further north; my reason for this is the wind sweeping over the land of Meta Incognita with

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The strait never freezes over solid in winter, the ice is always moving—the same among the islands; natives have wintered on Nottingham and the ice sets off and on shore there in winter as it does off North Bluff.

When 90 miles east of Resolution Island in the pack, I was hunting ducks, having shot several and wounded others. I saw a bladder nosed seal come up with something in its mouth and stake it, I thought it was a wounded duck, I tried to get it, I fired at the seal and prised in and hooked on to his prey which was a halibut weighing about thirty-eight pounds with two big bites out of it. In the Strait and Bay of Hudson and in the Welcome never got any bottom fish, but in Frobisher Bay on the south side there are some cod, salmon and trout are found in all the streams; the salmon are not the same as the Atlantic salmon—they are a trout; they are the same as I have found in the Okhotsk sea in Russia.

The Esquimaux are a shrewd fine people; they have all the ability of the white, but not the energy. I find them a very trustful people, also very honest. I have had them come 300 miles just to call on me, and when I was in need of help they would stick by me and were very generous.

I do not think that the Welcome ice ever goes out, it breaks up the reefs; the water in the Welcome is shoal, and there are many shoal spots. In Fox Channel I saw no reefs, other than the ones I named, but north of King's Cape the shoal water extends a long ways off; bergs are never seen in the Welcome or Fox Channel. Ice will freeze on an average about four feet in a winter, I have seen it five feet in a still place. When inside ice is found thicker than this, it is from rafting.

There would be no safety for a loaded merchant ship when the ice nipped, a light vessel would perhaps lift; I have made twenty-three voyages to the Northern seas, and have wintered eleven winters in the Arctic.

In Hudson Strait the ice on the south shore is always working out unless held by the wind.

I got becalmed once off Cape Best and I found the current set me right on shore. Resolution Island is not all one island, it is full of fiords and the tides set through it.

Get past Resolution Island in clear water if you can, as you are never sure of your vessel if you get caught in the ice near Resolution Island.

The above statement having been read over to me, I approve of and have signed.

JOHN O. SPICER.

CONCLUSIONS AS TO THE NAVIGATION OF HUDSON STRAIT.

In the preceding pages I have given with considerable detail an account of the conditions met with in Hudson Strait during the voyage of the "Diana," together with the experiences and remarks of some of the early explorers, and the statements obtained from a few of the most experienced whaling captains who have made numerous voyages in the bay, and have wintered both on the shore of the strait, and in the northern part of the bay. It, therefore, only remains for me to sum up, as briefly as possible, the conclusions I have come to, both as the result of my own experiences and those of the others I have referred to, regarding the period during which Hudson Strait may be held to be safely navigable by suitable steam vessels for commercial purposes.

In connection with the journal of the expedition I have thought it wise to present photographs of some of the conditions met with. It will be understood that it is always difficult to secure good views of ice even under favourable conditions of light and weather; during most of the time when we were closely beset in the ice the weather was either rainy or foggy, so that it was not always possible to get pictures of our surround-

ings. Such views, however, as we did secure show more clearly than words of mine could express the state and extent of the ice through which the "Diana" was forced on her passage into Hudson Bay.

It had been my intention to be off the mouth of the strait early in June. The "Diana" having been delayed at the seal fishery only reached Halifax at about the date on which I had intended leaving there for the north. We were also delayed on our passage up the Labrador coast owing to the extent of the ice through which we had to work our way into the open water of the Atlantic, so that it was only on the 22nd of June that I found myself on the 61st parallel and able to head in for the strait. Though I was disappointed in not being off the mouth of the strait at an earlier date, yet I do not consider that we lost much by the delay. We had been coasting along the outer edge of the ice which was steadily streaming to the southward, for several days without seeing any chance of finding a passage to the land. Two days before we entered the strait we had tried to get into the Moravian settlement at Okkak, but had found the ice so closely packed and heavy that it was useless to put the ship into it. At Cape Mugford we had got to within about twenty miles of the land, but from there north though we kept closely along the margin of the ice we had been gradually headed off shore so that when we turned in on the morning of the 22nd we were some eighty miles off the land to the eastward of Resolution Island. We headed in through the first fair looking lead we came to, we had not found any such an opening during all the time we had been skirting the ice on our way north. The ice was passing to the southward at the rate of about fifteen miles a day, so that even had we been off the strait say a week earlier, I do not consider that we would have got through any sooner than we did; in fact it is quite possible that had we been north earlier and attempted to force a way in, as we no doubt should have, we might have got fast in the ice and been carried to the southward in the pack. It was the opinion of several of our officers that our best chance of any early passage into the strait lay in getting in under the land between Nachvak and Cape Chudleigh and working round between the cape and the pack, passing in through Grey's Strait. We therefore kept a sharp look out for an opening which might have induced us to put the ship in for the land, rather than be headed off shore. I consider it fortunate that no such chance presented itself, we kept outside the pack until we were fairly abreast of the centre of the strait, and then headed the ship in through the first lead we met. We found the ice much gone abroad, loose and scattered; we did not know it at the time, but we were really passing through the last of the Baffin's Bay ice. Continuous northerly winds had been hurrying this ice to the southward since early in the fall of 1896. The experience of the fishermen who visit the neighbourhood of Cape Chudleigh for the purpose of cod fishery, is that under ordinary conditions the last of the Baffin's Bay ice does not pass to the southward before the middle of August. Captain Spicer was held shut up in his winter harbour inside the North Foreland until the 18th August, 1880, by the Baffin's Bay ice which had closed in on him on the 4th of November, 1879 (see statement of Captain Spicer, page 57, *ante*.)

Capt. Buddington, in the "George Henry," was held shut up in Rescue Harbour in the mouth of Frobisher Bay from the 17th of October, 1861, when he was shut in by the Baffin's Bay ice, until the 9th of August, 1862.

Capt. Clisby, in the "Era," got shut in by the coming down of the Baffin's Bay ice in the harbour of New Gummiute, near the North Foreland, in October, 1885, and only got released on the 7th of August next year. So that I consider we lost no time owing to the delay, but were really unusually fortunate in striking the entrance to the strait just when we did and under the conditions above described. I do not consider the risk of entering the ice to be met with off Hudson Strait during the end of June and in July is very great. Our experience of this ice, while working through it from the 7th to the 19th June, was that though it closed together so that we were held fast in it, yet there was no rafting or nipping, consequently the ship was in no danger. I allude, of course, to a suitably constructed ship. I do not believe that the ordinary tramp ship of commerce should ever be risked in heavy ice. The ice we met with outside the strait and along the Labrador differs from that met with inside the strait.

Outside we find first icebergs of all shapes and sizes; these come from the Greenland glaciers. Second, growlers; these are generally less or more heavy rounded knobs of

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ice formed by the breaking up of bergs, or from exceedingly heavy old floe ice such as that described by Captain Nares as existing in the extreme north. These growlers have evidently travelled a long way. They have a worn and rounded appearance. In the pack they are not dangerous, but adrift by themselves they are more dangerous than either bergs or field ice; they float low in the water, and even in moderately clear weather, especially at night, would easily escape notice. There is no doubt that the "Knight Bachelor," a view of whose bow we give, struck one of these growlers; it was not seen by the look-out, and judging from the impression left in the ship's bow, was not floating any great height out of the water.

Thirdly, field ice; this description of ice as met with between Newfoundland and Baffin's Land during the end of June and in July is not usually found in large pans; these have been broken up by the action of the sea. The experience of that part of the crew of the "Polaris" who made the memorable drift on the ice, after leaving the ship, shows that they were constantly in danger from the breaking up of the pans, as they drifted to the south; this ice, as we found it, varied in thickness, was not rafted to any considerable extent, and did not seem to have been subjected to much pressure, so that on the whole I do not consider that any great risk would be run by a suitable vessel in entering it during fine weather after the middle of June. Earlier in the season, off the mouth of the strait, this ice will be heavier, the pans of more considerable extent, the risk would be then much greater, especially as one neared the immediate mouth of the strait, where the tides and currents are unusually strong; given large and heavy pans and no deep ship would be safe. All former voyagers have dreaded being caught in the ice between Resolution Island and the Buttons, and for some distance inside, several sailing ships and at least one steamer have been lost by being nipped between the Buttons and the Middle Savage Islands and it was in about this locality that Capt. Gordon was fast in the pack with the "Alert" between the 15th June and the 6th July in 1885. It is quite likely that had the "Alert" not lost her iron stem plate she might have been forced out of the pack, and have made an early passage further up the strait. Capt. Gordon has been blamed for not continuing his voyage on this occasion, instead of returning to St. John's to repair, but no one but a fool would think of driving a ship into heavy ice without some iron covering to the stem. While we were in St. John's in September we saw in dock there one of the sealing steamers undergoing repairs for damages caused by the loss of her iron stem plate. This vessel carried away her plate in the ice off St. John's in April; in trying to extricate the ship from the ice the oak stem had been worn completely through, even the ends of the planking which butt on the stem had been eaten into; a sort of jury stem had been rigged by securing the spare rudder up and down the bow. The ship was in the company of other sealing steamers, and only a short distance from port, so that the crew could afford to run great risks in the attempt to save her; in spite of all this it was only with the greatest exertion that she was saved. In the case of the "Alert," deeply laden so that she could not be trimmed by the stern, far from port, and alone, with no possible chance of assistance, it would have been madness to have attempted to force a passage through the heavy ice of Hudson Strait, and continued the voyage in her crippled condition.

There can be no doubt that even with a suitable steamer great care should be taken not to get fast in the ice in the mouth of the strait or for some distance inside, as where heavy ice is rafting and piling up in pressure ridges no ship no matter how strongly constructed, that will not rise when nipped, would be safe for a moment.

We were extremely fortunate in the "Diana," on the 22nd of June, to enter the strait as easily as we did, there was a heavy pack of ice to the north of us extending westward from Resolution Island, but we steamed along the southern edge of it in open water, it was wheeling down across the mouth of the strait as we passed, and I have no doubt that had we been making the same passage a day or two later we might have had some delay in getting through, this pack seemed to be heavy and close. We steamed during the night of the 22nd of June and the morning of the 23rd some 120 miles into the strait, up to the Middle Savage Island, in comparatively open water, over the very track where most voyagers have found heavy close packed ice at about the same season, and even later. It was here that Captain Guy in the "Arctic" was carried

helplessly along in the pack in May and June, 1886. He had been caught in the pack outside of Monumental Island on the 25th May, swept round south of Resolution Island, and only released near the Lower Savages on the 2nd June. The "Arctic" was a large powerful ship, her power in proportion to her tonnage was greater than that of most freighters, and when such a ship, built specially for ice navigation, strengthened and braced so that she could be driven full speed at or through heavy ice, could be helplessly jammed, it is absurd to think of forcing a ship of wood or steel, built to carry freight at a profit.

All the ice we saw in the strait up to noon on the 23rd of June was Baffin's Bay ice. This was driven into the strait by easterly winds and swept along the north shore by the current which sets pretty steadily up along the north shore as far as Big Island, Bay or Strait. This ice is easily distinguished from that which is made in Fox Channel, or in Hudson Bay or Strait. This latter I call inside ice, it is lighter and thinner when not rafted, in larger pans; does not show the evidence of rough usage and wear that the outside or Baffin's Bay ice does; it contains no bergs or growlers; pressure ridges are found running all through it; it is more soiled in appearance, especially that which comes out of Fox Channel showing that much of it has been capsized, piled up or rafted on shore or in shoal water bringing up sand, gravel and small stones from the bottom, while no doubt a good deal of the debris found on it is blown from the hill tops, high beaches or bluffs. We found that much of what appeared to be sand or earth at a distance on a close examination turned out to be a delicate brown alga growing in small cups of water on the surface of the ice; at a little distance it gave the ice a rusty appearance, specimens of this alga were secured and preserved; they are now being examined by the scientific officers of the department.

Baffin's Bay ice is no doubt sometimes, by continuous east wind, carried as far west as Big Island. Bergs may even be taken up to Charles Island and any bergs found in the strait must have come in from Baffin's Bay as there are no glaciers in Fox Channel, Roe's Welcome or Hudson Bay.

The barrier of ice which we met on the afternoon of the 23rd of June, and which I have fully described in the early part of this report was composed entirely of inside ice. The long prevailing easterly winds had simply dammed the ice pack, and the strait had filled up with the ice which was being poured in from the westward. I believe now that I did wrong in forcing the ship into this barrier; it is easy to be wise after the event. We were all anxious to get on and make if possible a record passage. We felt that we had a stout able ship, but we had no idea of the weight and extent of the pans, or of the manner in which they surged about. I am fully convinced that had I stuck to my original intention and kept outside of the pack until we had a change of wind, and the ice began to go abroad, we would have got through and into the bay a few days earlier than we did, and the ship would not have been as roughly used as she was. I think we would have found slack ice along the Labrador shore between the body of the pack and the mainland. The authorities generally have advised sticking to the north shore on the inward passage on account of the favourable current; this may be all very well with sailing vessels, but the case is quite different with a steamer; this favourable western current really packs the ice on the Big Island shore; the currents and eddies are much stronger on that shore and the ice surges about more. Were I going in again and found similar ice conditions I should hug the south shore. The current would be against me, but with a steamer this is really not a disadvantage, as it loosens the ice and keeps it in strings with open water or loose patches between.

From the 23rd of June to the 8th of July, when the ice began to go abroad slightly, the strait was blocked from a line running from about Icy Cove over to Cape Hope's Advance on the eastward right up to Salisbury Island to the westward, a distance of nearly 250 miles. This jam consisted of heavy ice, mostly in rafted pans running from three to thirty feet in thickness. What I should call the bay ice was generally thin and not so much rafted as that which came from Fox Channel. Through this jam no ship could have penetrated any faster than the "Diana" did. A large and more powerful vessel, such as the "Arctic" or the "Terra Nova," might have made more headway in light, close, brashy ice, but among the large pans, of which the jam was

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mostly made up, the "Diana," owing to her handiness and ability to turn quickly, possessed an advantage which was worth more than weight. Into such a jam it would not be safe to put a deeply laden vessel or to allow her to be caught. I do not allude here to what is known as the ordinary tramp ship, but to such a vessel as was described by Captain Gordon as being most suitable for the trade to Hudson Bay—"a ship of about 2,000 tons gross, fortified for meeting the ice, and of such a construction as to enable her to be a fair freight carrier, well strengthened forward, to have wooden sheathing, a full counter, small propeller well down in the water." Even such a vessel I say would not survive a nip in such ice as the "Diana" was in from the 24th of June to the 10th of July. On the return voyage, between the 14th and 21st of July, we found a great change in the conditions in the strait. Any one having any experience of ice must have remarked that when it begins to loosen out and drift backwards and forwards with the tide, particularly if exposed to a warm sun or rain, it is wonderful how quickly it disappears. This is just what happened with the ice in the strait. With the change of wind it opened out. The weather, which had been raw and cold with frost at night, became warm and bright, and in less than a week the bulk of this enormous mass of ice had simply dissolved away. I consider that the climatic conditions are such that in the strait there is but little thawing of the ice in June. In Churchill Harbour the ice only breaks up about the middle of June. This is considerably south of the strait, within the wooded belt, and the breaking up of the harbour ice is due, not to an actual thawing out, but to the flood of warmer water coming down from the interior. At Nachvak, on the Labrador, over 200 miles south of Big Island, the bay ice only breaks up towards the end of June. When we made Ashe Inlet, on the 19th of July, we found the harbour ice only just broken up and coming out. I am of the opinion that after the 15th of July very little, if any, of the inside ice ever reaches the Atlantic. Some of it may be carried into Ungava Bay round Hope's Advance, but most of it will have disappeared soon after passing the neighbourhood of Stupart's Bay. In the north-western part of the strait heavy ice will be met with all through the season. This is the ice from Fox Channel. Under ordinary conditions it streams steadily down between Salisbury Island and the Baffin Land shore in the direction of the eastern end of Charles Island. Long continued and strong north-east to easterly winds must drive it down past Nottingham and even over to Wolstenholme, so that it will always have to be reckoned with. I believe that the endless stream of this ice which comes down along the western shore of Fox Channel is due to the fact we have here discharging, not only the ice from the channel itself, but also a share of that from the Gulf of Boothia and further north. McClintock, in his voyage of the "Fox," referring to the tides in Bellot's Straits and the Gulf of Boothia, says:—"As in Greenland, the night tides are much higher than the day tides. The flood tide comes from the west. Such is also the case in Fury and Hecla Straits. In both places (Bellot's Strait, Fury and Hecla Straits) the tide from the west is much the strongest." This being the case, I should expect that a good deal of the ice from the Gulf of Boothia is carried through Fury and Hecla Straits into Fox Channel and on down into Hudson Strait. The ice discharged from Fox Channel into Hudson Strait is much heavier and older than any other ice found there, and can be readily distinguished whenever met with. The whalers I interviewed at New Bedford and New London claimed that a tide set into Fox Channel from the north-east, and they believed that channels existed between Home Bay and Pond's Inlet and the north-east part of Fox Channel. Old charts show such channels. On talking the matter over with Dr. Dawson, Director of the Geological Survey, he was kind enough to offer to write to Dr. Boas, who had wintered in Baffin's Land and made considerable explorations there. Dr. Boas replied to Dr. Dawson as follows:—

"I have your favour of the 3rd inst. I think that the idea of the New Bedford whaler is erroneous. You will see on my map of the coast of Davis Straits that I travelled along Home Bay, and there is certainly no water communication to the west. You will, of course, understand that I did not follow the shores right along, but I think it very unlikely that any deep inlet should have escaped my attention. I also consider the descriptions by the Esquimaux entirely trustworthy. I have not seen the shores of Pond's Inlet, but if you will consult the Esquimaux maps published by Nourse in his

description of Hall's Second Expedition you will see there is no water connection in that direction. This agrees with the information I obtained from the natives of Pond's Inlet, whom I met on Davis Strait. I should not wonder if the tides in Fox Channel are quite different on the east and west sides. We must remember that Fox Channel is probably a basin with a very narrow entrance to the south, deep on the west and very shallow on the east side, so that we may expect very irregular currents."

Under these circumstances and as Pond's Inlet and Home Bay seem to have been pretty well examined by whalers and others, and no channels are reported running out of them in a south-westerly or westerly direction, I think it may be taken for granted that no such channel exists. The tide which Captain Spicer found setting from the north-east was undoubtedly that sweeping in from the westward through Fury and Hecla Straits. With strong easterly wind a good deal of the Fox Channel ice is driven in between Belle Island and Southampton Island, and even down towards Mansfield and Coates. Whalers coming out from the Welcome in September have frequently been forced to go round south of Coates as they have found Fisher's and Evan's Straits blocked, this was the case last fall. Captain McKenzie in the "Platina" leaving the mouth of the Welcome homeward bound on the 19th of September, found Fisher's Strait blocked and was forced to go south of Coates Island.

The ice in Hudson Bay will never give much trouble to steamers; at present sailing vessels dread it greatly, not from any danger of nipping, but because they are liable to be becalmed in it. The ice from Roe's Welcome is occasionally set by north-east winds and the current down along the western shore of the bay as far as Cape Tatnam it has filled up Churchill Harbour and Bay in August, so that vessels could not enter. In 1896 the Hudson's Bay Co.'s SS. "Eric" was delayed eight days in this ice between Mansfield Island and Churchill. From the western shore at Cape Tatnam the ice is set across the bay towards the islands on the East Main coast and thence carried north by the current between Mansfield Island and the mainland of Labrador. I should say that none of the Welcome ice ever reaches the strait.

Winter in Hudson Strait sets in early in September. We had our first regular snowstorm off Cape Digges on the 7th September; from that date on snow continued to fall regularly. We ran up the Ungava River on the 17th of September in a thick snowstorm. The snow along the skirt of woods behind Fort Chimo was then a couple of feet deep. We came out of Ungava Bay and round Cape Chudleigh on the 20th September, with the snow falling steadily. The hills and rocks were everywhere thickly covered with snow as far down the Labrador as Cape Mugford. We re-entered Hudson Strait on the 15th of October in a snow storm; we had had more or less snow all the way up the Labrador from Belle Isle. From the day we re-entered the strait until the day we left, the 30th of October, it snowed more or less every day, and when not actually snowing there hung over the water a dark mist; looking at it from the shore or from shelter, it appeared to be quite black; when we got into it it turned out to be minute particles of snow or ice; the sailors called it frozen fog, and I can imagine no better description. It was just as thick as fog, and we could not see any further through it. Capt. Fisher (see p. 55) speaks of it as "vapour or steam rising off the water," owing to which he could see nothing. It is the certainty of this condition which drives the whalers into winter quarters as early as the end of September. Capt. Coates (see p. 50) alludes to it as "dark condensed fog." Whatever you may call it, it will always make the navigation of Hudson Strait extremely risky after the middle of October.

The ordinary spirit and pole compasses of the "Diana" were utterly worthless from the moment we entered the strait, but the standard compass, one of Sir William Thompson's which I had taken from my own ship and fitted to the "Diana," gave us the greatest possible satisfaction. Once properly compensated it never varied, and we learned to trust it most implicitly.

The only safety during snowstorms or while navigating in the frozen fog, was to go slow or stop entirely, and keep the lead constantly going. In the strait the lead is of very little value, as the water is bold to; off Capes Digges and Wolstenholme we got no bottom at 120 fathoms within a couple of hundreds of yards of the rocks. The currents are strong and uncertain, and in spite of every precaution we were frequently out

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in our dead reckoning. These conditions, together with the further fact of the short days, the difficulty in distinguishing the land, or judging accurately the distance when you do get a glimpse of it when all is covered with snow, and the constant gales of wind shifting suddenly from one quarter to the other, make the navigation of the strait during the month of October extremely difficult and hazardous.

There can be no question that we were favoured with an unusually open season, and once the strait became clear, after the middle of July, we encountered much less ice than others have constantly met with.

The records of our meteorological observations having been submitted to Mr. Stupart, Director of the Meteorological Service, for comparison with those made in 1884-85 and 1886, he writes me as follows:—

"I inclose herewith a weekly abstract of meteorological observations taken on board Dominion SS. "Diana" between 5th June and 6th November; also a short report based on these observations. Comparing the weather in the strait during this past summer with the weather experienced in 1884-85-86, it is very obvious to me that you had this year a most favourable and open season, and that the winter weather set in later than usual. The most doubtful thing is the force of the winds. According to the records you had very few gales indeed. In September, 1885, and also in 1886 heavy gales followed each other in quick succession."

I have pleasure in submitting Mr. Stupart's report, along with the weekly abstract of the meteorological conditions which he has had prepared.

I now conclude this part of the report by saying that I absolutely agree with Captain Gordon in fixing the date for the opening of navigation in Hudson Strait, for commercial purposes, by suitable vessels, at from 1st to the 10th July. I do not consider that the strait can be successfully navigated in June. Such ships as the "Diana" might force a passage through, but these vessels would be useless for commercial purposes. They have to be so braced and strengthened that they are impossible freight carriers.

I consider that navigation should close from the 15th to the 20th of October. I would not dread the ice in October, though there is always a chance of the western end of the strait being blocked by the Fox Channel ice between Nottingham and Digges, or even about Charles Island. I believe, however, that as westerly winds prevail at this season the block would not be permanent and a passage will generally be found along the Labrador shore which is bold and good. In Captain Hawes' journal at Churchill, which is certainly the most available harbour on the western shore of the bay, I found that on the 1st of October, 1895, his men were off hunting on snowshoes, and there had been good snowshoeing for ten days. The ice was also at that date running up and down the harbour. Of course the harbour does not usually freeze over before the end of October, but for some time before it closes it would not be safe for vessels owing to the rush of the ice in the strong current. Captain Hawes, an old sailor and an exceedingly observant and intelligent man who had navigated the strait since 1864 and of recent years has been settled at Churchill as agent in charge, fixes the date for the closing of Churchill Harbour for shipping at the 15th of October. I have already described the climatic conditions met with in October. We were favoured with a mild and comparatively calm month, yet the risks of navigation were so great that I have no hesitation whatever in saying that after the last date which I have given above it would be folly to think of carrying on any commercial traffic through the strait. I would therefore fix the 20th of October as the extreme limit of safe navigation in the fall.

There is another and serious obstacle to the later navigation of the strait which I have not seen mentioned elsewhere—that is, the blocking of the eastern entrance of the strait by the descent of the Baffin's Bay ice. In October, 1885, the whaler "Era," Captain Clisby, was shut in for the winter near the mouth of Frobisher Bay by the wheeling in of the Davis Strait ice. On the 4th of November, 1879, Captain Spicer was shut up in New Gummiute, just inside the North Foreland, by the closing in of the pack from Davis Strait.

On the 17th of October, 1861, Captain Buddington in the "George Henry" was shut up for the winter in Rescue Harbour by the closing in of the Davis Strait ice.

Captain Hall in his Arctic Researches thus describes the closing in of the ice on this occasion. The "George Henry" had already passed one winter in the north, they were getting short of supplies, and were ready to sail in a few days for New Bedford.

"The summit was finally reached and a moment's look round was sufficient to repay me for all the efforts I had made to gain that point. Field Bay, Davis Strait, Frobisher Bay and Kingaita were within sight. I was surprised at the height we had evidently gained. Lady Franklin Island out in Davis Strait, Monumental Bay, and the islands off the extreme land between Frobisher Bay and Field Bay which I visited last winter loomed up as I had never seen them before at so great a distance from them, showing that the high land on which I stood was high indeed."

"I took the spy glass and proceeded to make a prolonged observation. I first directed the glass towards the vessel which was at a distance of seven miles, I then directed it to Davis Strait. This I saw was filled with a heavy pack. I swept with the instrument along down said strait to the extremity of Hall's Island; no black water; naught but pack, pack met my view. I asked my native attendant Shevikoo to look at the sea ice; when he had viewed it carefully I asked him: 'Do you see much ice?' He replied, 'Noud-loo, Noud-loo, yes, yes.' I took another prolonged look before I left. Monumental Island was white and its sides presented no black rock peering out, and the same was true of Lady Franklin Island. The pack appeared very rough; much pinnacled ice was among it."

"When I got on board, Captain Buddington came to me asking if I had seen any heavy ice pack in Davis Strait. I told him I had and proceeded to give him as truthful an account of it as I could. I was astounded at the effect it produced upon him. Then it was I first began to realize, to feel the overwhelming importance, the momentous character of that pack. On getting through my description, telling him that I not only took repeated careful looks through his glass, but had required Shevikoo to do the same, Captain Buddington with fevered brow responded: *Our fate is sealed. Another winter here. We are all imprisoned.* He said further that to take the pack at this season of the year would be the very height of foolhardiness. In the spring the whalers do not hesitate to do it, for then constant daylight and warm thawing weather is expected. But now everything is freezing up; long dark nights are upon us, and the "George Henry" (she was afterwards nipped and lost in Hudson Strait) is not such a vessel as one should think of venturing with into dangerous places. Captain Buddington is thankful that I made the trip I have to-day. He says what would have been our condition had you not seen and reported this. As soon as possible (three days) I should have been on our way. I should have weighed anchor and raised sail at the first fair wind, but in what kind of situation should we soon have found ourselves? *In the pack without the power to retreat.* On the 20th of October the ship was frozen in, the ice in the harbour being strong enough to walk on. On the 25th of October Captain Buddington sent three natives on the mountains to see the position of the pack. They returned and their report removed the hope of those who were still looking to get out of our imprisonment this season. The natives state that seaward it is all ice. The lower and entrance part of the bay is filled with pack, 'all white, no black.' The effect produced by this upon some of the men was very painful."

Capt. Charles Smith, of Dundee, who has called at Cumberland Sound returning from a whaling voyage further north for five seasons, reports that he left Cumberland Sound in the "Esquimaux" on the 15th October last, homeward bound for Dundee; when outside the headlands he met the heavy ice coming out of Davis Strait and had to steam 150 miles south to get round it. He sighted Lady Franklin Island on his course. That is to say, Capt. Smith had to come south between the Davis Strait pack and the mouth of Hudson Strait 150 miles before he could shape his course across the Atlantic for the north of Scotland. Westerly winds had prevailed and the pack was blown off shore. This pack must have been well down on the Labrador when we came out of the strait on the 30th of October, but the wind held it off shore.

Now this same pack so graphically described by Hall is carried right across the mouth of Hudson Strait, which is only separated from Frobisher Bay by Resolution Island, and on down along the Labrador shore to the north-east coast of Newfoundland. It moves on and off shore with the wind. As described by Hall, it is heavy pinnacled ice, into which it would not be safe to put a loaded ship during the end of October.

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The steamer "Virginia Lake," returning from Sandwich Bay during the first week of December, 1897, reported the Arctic pack visible off shore just north of Belle Isle; by the end of the month it was down on the Newfoundland shore blocking all the north-eastern ports.

In the St. John's Evening *Herald*, 21st December, 1897, it is stated that the SS. "Nimrod," Capt. Newberry, had just arrived from the Strait of Belle Isle. Ice was met with from Greenland out round Cape Norman (in the Strait of Belle Isle), and it covered the ocean as far as the eye could see beyond Belle Isle—real heavy ice of a dangerous nature.

On January the 26th, 1898, the St. John's, Nfld., papers report, "the ice blockade at that post has raised to-day, freeing the 'Grand Lake' and 'Portia,' which were outward bound, also permitting the Allan's 'Numidian' to enter the harbour. No sailing vessels, however, ventured out. Reports from the northern portions of the island show that the whole shore is blocked."

In the St. John's Evening *Herald* of February 5th is the statement, "Another disabled steamer was signalled from Cape Spear and at noon entered in tow of the 'Ingraham.' She is the SS. 'Addington,' Capt. Harland, nine days from Baltimore for Bergen, Norway, with a cargo of rye. Yesterday at noon Cape Race was passed and the first ice met, but the captain, thinking it was only a narrow string, steamed away north hoping to get through without damage. Gradually it became heavier, and when about 30 miles south of Cape Spear a heavier pan than usual was struck. The impact was terrific although going at reduced speed, and ere anything could be done the iron plates were smashed in. The starboard bow plates, even with and just below the water line, were crushed, while the port bow had several loosened and the rivets smashed off. She at once bore up for this port, as it was feared another storm would do greater damage, and five miles off Cape Spear the slob was so thick, the 'Ingraham' was hired and had hard work towing to port."

Now this is all heavy Arctic ice, the same as that in which McClintock got fast in Melville Bay, in the "Fox," in the end of August, 1857, and in which he made his memorable drift, wintering in the pack during the winter of 1857 and 1858, and only getting released on the 26th of April, 1858, when south of Cape Mercy.

This pack has, therefore, to be reckoned with by every one coming out of Hudson Strait during the end of October. It has been down as early as the 15th October; we saw nothing of it on the evening of October the 30th last, but it was snowing heavily at the time and we might have passed close to the pack without seeing it. It could not have been far away, as the ice was in sight from Belle Isle during the first days of December. Given a drift of 15 miles a day, which is not an excessive allowance, it must have reached the mouth of Hudson Strait on the 1st of November.

There are many reasons I have enumerated, I consider the 20th of October as the extreme date for safe navigation in the fall. To such brave and experienced mariners as the late Capt. Gordon of timidity because he refused to force the "Alert" through the ice of Hudson Strait in June, after she had lost her stem plate, or "Diana," as "feather bed sailors," because we left the strait with the end of October, these conditions are frivolous and will have no influence; but to the ordinary sailor and ship owner, I flatter myself, sir, they will be plain and sufficient.

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PART IV.

THE FISHING CAPABILITIES OF THE REGION, AND THE EXTENT TO WHICH ALIENS CARRY ON FISHING OR WHALING WITHIN OUR TERRITORIAL LIMITS.

I was instructed to cruise through the bay and ascertain its capabilities for fishing purposes, etc., but owing to the length of the time taken up in getting through the strait in the first instance, and in making a series of later trips through to fully satisfy myself as to its navigability and having then to go down the Labrador coast to Nachvak for coal, and make a trip north into Cumberland Sound to inquire into the extent to which trade is carried on by aliens, the season was far advanced before I could make any attempt to test the waters for fish. When we did make the attempt we happened on extremely rough weather, the roughest we had experienced since leaving Halifax, so that I am not prepared to speak very positively as to the fishing possibilities in Hudson Bay. In Hudson Strait the currents are too strong and the water too deep and cold to expect any bottom fishing for cod and halibut. It will be more convenient to discuss the question of fisheries by taking up the various fishes and mammals in detail.

SEALS.

Seals congregate in large numbers on the smooth pans off the Labrador in January, February and March. These are mostly harps and hoods. The spring hunt takes place in March and April off the north-east coast of Newfoundland, and as soon as the young seals can look out for themselves and the ice begins to loosen, scatter and dissolve, the northerly migration sets in. Very few, if any, of these seals enter Hudson Strait or Bay. They pass north along the eastern shore of Baffin's Land and are scattered indefinitely throughout the bays and coves far to the north. I do not consider that any profitable hunt for seals could be carried on during the opening season of navigation anywhere in the north. The seals are scattered. They are extremely shy and difficult to approach; in fact, no one but an Esquimaux in his kyack would stand any chance of getting near enough to spear or harpoon them. If killed outright with a charge of shot or ball they sink before you can get near them. The only way a profitable seal hunt can be made is by the methods now followed in the Gulf of St. Lawrence and off the Newfoundland coast in March and April, and it is a wise provision of nature that at other times these mammals betake themselves to the far north and are so scattered and difficult of approach as to be practically safe. Seals are not numerous in Hudson Strait or Bay. We saw a few old square flippers on the ice when we first passed through the strait. These seals were almost as large as walrus. In the bay we saw very few seals, and these only along the shore. I do not think that the bay seals ever pass out of the strait to join in the southerly migration. The whalers say that seals are not numerous in Fox Channel or Roe's Welcome. Most of the seals killed in the Welcome are square flippers; these the natives seem to look on as a cross between the walrus and the seal.

Seal meat forms the principal food of the Esquimaux—it is generally eaten raw; as the Esquimaux lives beyond the wooded region he has little or no means of cooking his food. A little heat and light is obtained by sticking a wick of dried moss into a piece of seal fat, the whole being held in a shallow stone dish; over the flame of this lamp is suspended a small stone pot capable of holding about a pint. A kind of stew sometimes may be made in this, but the bulk of the food is consumed raw, and in winter frozen. As the fat, blood, entrails and flesh of the seal form the staple article of food, so the skin furnishes the dress of the native. The summer dress of men and women

consists of a seal skin jacket, worn with the hair out, trousers coming to the knee of the same—also worn with the hair out, and boots of the dressed skin of the seal with the hair off; these boots are water tight, they come up to the knee and are there fastened with a thong. These jackets and trousers are often highly ornamented with borders and patterns of different coloured skins. Some of the more fashionable women wear very handsome jackets of young seal skin; these are highly dressed and worn with the hair inside, and are worked and decorated with ornamental work of various kinds, beads, coins, bowls and shanks of pewter spoons, old brace buckles, and any other similar trinkets that the wearer had been fortunate enough to pick up. The jackets of both men and women are fitted with hoods, the man's hood is just large enough to cover the head, and is the only head covering worn; the woman's hood has to be large enough to carry her child, which lives naked in the hood until it is about two years old, when it is taken out and dressed as an adult. In winter the seal skin jacket is worn with the hair in, and an outer jacket of deer skin is added with the hair out. Mitts are generally made of seal skin or the skin from the shank of the deer. All the sewing, both of boots and clothing, is done by the women; they are most expert with the needle, which they hold between the thumb and fore finger, with the point towards them. They use sinew for thread, and in the absence of a steel needle they use one made of bone. In making or mending the boots they soften the skin by chewing it well before sewing it; a little nourishment it is said to be sucked out of the oily, greasy skin in doing this. The kyacks (men's skiffs) and oomaicks (women's boats) are covered with seal skins without the hair, and similar skins are used for covering the summer dwelling or teepee. Sleeping rugs or bags are made of dressed deer or bear skins. Great ingenuity and patience is shown by the Esquimaux in hunting the seal; when hard pushed for food for himself and family the hunter will sit motionless for days over a seal house or air hole watching for the return of the seal; this in a temperature a long way below freezing.

WALRUS.

The walrus like the seals go north in the spring and return south in the fall; they were at one time abundant in the Gulf of St. Lawrence. I have frequently seen their bones turned out of the earth at Anticosti and the Magdalen Islands. They are now however seldom seen south of Nachvak though an odd one is occasionally found among the seals on the ice. We saw very few in the strait until October when several considerable schools were met with off Douglas Harbour and about Cape Digges. They are hunted by the natives for their flesh and fat which is used as food, though it is not considered as good as seal. The skin is sometimes used for soleing the boots, but its most common use is for dog traces and harpoon lines. For this purpose it is dressed without the hair and cut evenly and smoothly into long lines. The ivory of the tusk is used for making spears and lances. The natives are expert workers in ivory. Near the whaling stations the walrus hide is sold to the agents and exported for the manufacture of belting. The ivory also commands a certain value though owing to its smaller size and its flaws or defects it never commands anything like the same value as elephant ivory. Proportionately the walrus has not as much fat as the seal. They are difficult to kill, though a single native in his kyack and armed only with a lance and harpoon will not hesitate to attack them. They have always to be treated with respect and caution, as when disturbed or wounded they will come straight for the boat, and either try to stave her in from below or tear her to pieces by getting their tusks over the gunwale. We had a most exciting adventure with one off Big Island. He was wounded from the ship after some hundreds of shots, from all kinds of arms, had been fired at him. He made no attempt to get off after he was wounded but would even have attacked the ship. For fear of losing him we got the boats out with arms, harpoons, axes, gaffs, etc., for some time he held us at bay. The men followed him over the small pans of ice, or more often he followed them. They smashed the oars over him, but they might as well have beaten him with pillows. A perfect pandemonium reigned for some time, the men being seized with a sort of blood frenzy. I held the ship close to the scene of the battle, which was taking place on, or among, the loose ice, and for some time vainly tried to produce order. One boat got stove in, though I have my doubts as to whether the

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damage was not caused by some one letting off his gun in the wrong direction. All the oars and gaffs were broken. The harpoon had not been ground and the soft iron shank of the boats on to small pans of ice and thus were separated from them, and from each other, and the walrus was getting decidedly the best of it as he scrambled on the pans and chased the hunters. By dint of shouting and using pretty forcible language, I got one of the boats back to the ship, had her fitted with a fresh set of oars, got down into her myself and getting close up to the walrus finished him with a couple of shots out of a short Snider, holding the muzzle only a couple of yards from his head. We got him safely alongside and hoisted in; he was about 11 feet long, girthed 8 feet around the shoulders and must have weighed almost a ton. Walrus are not found far off shore; they remain about isolated rocks or islands, or under inaccessible cliffs. They are not numerous in Fox Channel or the Welcome nor along the western shore of the bay. They are reported to be plenty on the islands off the East Main.

They are sometimes killed in considerable numbers off the edge of the ice in Cumberland Sound, as they are going north, by the natives engaged in the spring whaling—otherwise not many are taken. The skin in this case is sold to the agent of the nearest whaling station; it is worth from five to six cents a pound in England, where it is used for belting. Six average sized walrus should yield about a ton of oil, this is usually mixed with the whale oil and sold as such. The ivory is not sold to any great extent, it is either retained by the natives to work up into spears or lances, or used locally for carving into ornaments.

The Moravian missionaries on the Labrador collect all they can, the natives about the mission stations are set to carving in winter, and the product of their work is sent to Europe for sale. The number of whaling vessels going north having greatly decreased, I do not consider that the walrus will suffer any further diminution, that is north of the strait; they are fairly abundant now and with only the natives hunting them for food, they should soon be as plenty as ever; we saw a good many in the strait in October, they were then returning south for the winter. On the Labrador shore they are likely to be soon exterminated.

WHITE WHALE.

An extensive fishery used to be carried on at several points by the Hudson's Bay Company for the white whale, notably at Ungava and Churchill; this was when the oil had a greater commercial value than it has now. At the present time they are only taken to provide meat for the dogs in winter, the oil is not saved and the skins have little or no commercial value. The fishery is always carried on in a river; long heavy nets are rigged out to buoys and anchors from certain favourite points. These nets are sunk, the whales come up with the rising tide; at high water the nets are raised and set out and a certain number of the whales are barred off; at low water the hunters go out in boats or kyacks and despatch them with guns and lances. A good many white whales were formerly killed in the rivers at the head of Cumberland Gulf; it was the custom, if the whaling voyage to Baffin's Bay, or Lancaster Sound, had not been a profitable one, for the whaler to call in at Cumberland Gulf on his way home, and if possible fill up his tanks with the oil of the white whale. It usually took about seven to yield a ton of oil. This is now no longer done, and the white whales are practically undisturbed. In 1897 the fishery at Ungava was a good one, some sixty whales being captured. They were, however, taken entirely for dog food. A few are occasionally killed by the Esquimaux; they use the flesh and blubber for food, the skin for food or for lines and traces. The white whale goes off shore into the Atlantic during the winter, returning into Hudson Bay, Ungava, Roe's Welcome, Fox Channel, Frobisher and Cumberland Gulfs as soon as the ice breaks up. During the summer season they seem to feed entirely in the rivers, moving up and down with the tide, they are very destructive to salmon and trout.

NARWHALS.

The narwhal is not abundant, an odd one is taken now and then by a whaler or an Esquimaux hunter; they do not yield much oil. The native uses the flesh and fat for

food. White hunters kill them for the sake of their long twisted ivory horn, otherwise they have no special commercial value. They are generally closely associated with the white whale. We saw several come up to breathe through holes in the ice when we were fast in June or July, but we did not succeed in killing any.

WHALES.

The whale fishery has greatly fallen off of recent years; this is due both to a scarcity of whales, and the depreciation in the value of the oil, which has been replaced both as an illuminant and a lubricator by the much cheaper mineral oils. At one time, between thirty and forty years ago, upwards of twenty vessels sailing out of New Bedford and adjacent ports, were engaged in the whale fishery off the mouth of Hudson Strait and in the northern part of the bay and Welcome. The vessels entering the bay usually wintered at Marble Island, Whale Point, or at Repulse Bay in the head of the Welcome. English or Scotch whalers did not often enter the bay, their whaling grounds being in Baffin's Bay, Lancaster Sound or Barrow Strait. They frequently called in at Cumberland Gulf on their way home, and remained whaling in the gulf, or off its mouth, as late as the ice would permit. The whale taken in all these northern waters is the "Bow Head" or "Greenland Whale" (*Balaena mysticetus*). During the last twenty years the whale fishery has been steadily failing; steam was first introduced about 1858, at present, of the New Bedford fleet, only three small sailing vessels remain, and these are not always out. The Dundee fleet has also gradually dwindled; as far as I know only the SS. "Esquimaux" having been whaling in 1897. Her voyage was a failure and, on her return, she along with the "Terra Nova," belonging to the same owners, was offered for sale. No new whalers, either sailing vessels or steamers, have been built for some years and as the existing vessels which are fit for no other work become worn out or are lost, they are not being replaced. The Hudson's Bay Company has had a small sailing barque named the "Perseverance" whaling in the Welcome for several years; her trips have not been a success, and I understand that she has gone home and will not return.

The whales found about Marble Island and further north in the Welcome are believed to enter via Hudson Strait in May and June; they return to the Atlantic in the fall.

Whales are taken in Cumberland Gulf off the edge of the ice in the spring. They are then on their way north and remain for some time playing or feeding about the mouth of the gulf which freezes over in the winter. They pass on north in June and do not return to the gulf until about the end of September or October, when the ice is again making. The very large whales do not enter the gulf.

At the present day, the only profitable and successful manner of carrying on the whale fishery seems to be by the establishment of sedentary stations, managed by an experienced whaler and employing the natives to do all the work. The Esquimaux, or Innuits as they prefer to be called, are first-class boatmen and get to be quite as expert as white men in the use of the modern whaling tools.

We found in Cumberland Sound two considerable sedentary whaling establishments—one at Kekerton on the north-east side of the gulf and the other at Black Lead on the south-west shore; both these establishments are at present owned by the Messrs. Noble of Aberdeen; and have been in operation for some 35 years. The establishment at Kekerton is managed by Mr. Mutch, who has been in charge for upwards of 35 years. He was absent at the time of our visit, having returned to Scotland during the fall of '96. We met at Kekerton his assistant, Mr. Milne, who was daily expecting his chief back on their supply vessel, a small brig called the "Alert." This vessel usually arrives from Scotland about the 15th of August, experience showing that this is about the earliest date at which she can safely cross Davis Strait and enter the gulf after landing her supplies of fuel, provisions and such few articles as are required for trade with the natives first at Black Lead and then at Kekerton; she returns to Aberdeen in September with the oil and bone taken during the previous fall and spring. At Kekerton we found a well-built dwelling house with capacious store rooms and work shops; half a dozen large and highly finished Scotch built whale boats and a most

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complete whaling outfit, all in the most perfect order. The boats were up on skids and were painted and varnished; the oars, gaffs, etc., scraped and whitened as perfectly as those of any man-of-war gig; the bomb guns, harpoons, lances, spades, and all the tools pertaining to a whaling outfit, neatly racked, polished and shining. The whole in the most man-of-war order and perfection; all this was the work of the natives under the direction of Mr. Milne. At this station there are living and attached to it about 150 natives, men, women and children. At the time of our visit the most of these were away in the interior deer hunting. The natives are engaged on the following conditions—each family to receive the following weekly ration:—Four pounds bread (ship biscuit), one quarter pound of coffee, two and a half pounds molasses, four plugs of tobacco.

When not engaged at the whaling, preparing for it, or cleaning up after it is over—that is in winter from December to April—they are allowed to leave the station and find their own food by hunting seals through the ice. They also require the skins for inside and summer clothing, and for covering their kyacks and teepees. Between April and July they are engaged at the spring whaling; when this is over they go into the interior of Baffin's Land for the deer hunt, returning to the station in time to fit out for the fall whaling.

At Black Lead we found another somewhat similar station under the management of Mr. Sheridan, employing about the same number of natives. There was also here the Rev. Mr. Sampson, a church missionary sent out by some society in England; he had come out in the "Alert" in 1896.

Both at Black Lead and Kekerton similar establishments to those of the Messrs. Noble, though on a less elaborate scale, had been maintained by the Williams Company of New London, Conn., until three years ago, when these people had retired, selling out to the Messrs. Noble. The Williams Company had been established here since 1859, and for many years these stations had been managed by Captains Spicer and Sheridan; the latter had remained here and transferred his service to the Messrs. Noble.

A third sedentary whaling station had been operated by the Williams Company at a place called New Gummiute, near the North Foreland, just inside of Monumental Island. When the Cumberland Sound stations were given up, this one had been sold by the Williamses to Captain Clisby, the manager of the station. Clisby was drowned in 1896. His assistant named Jansen had been badly frozen and was taken to the United States by Lieutenant Peary in the "Hope" in 1896. A few days before our calling at Black Lead the whole of the natives formerly attached to the New Gummiute station had moved up to Black Lead, so that for the present it was abandoned. For several seasons no supply vessel had called there and the station was out of everything. The average catch for a number of years at one of these stations would be about one and a half whale per season.

A whale having bone 10 feet long will yield from 10 to 14 tons of oil. The oil is worth about £22 a ton and the bone £2,500 per ton; the average bone will run from 9 to 10 feet and should weigh about 17 cwt. The values given above are those in England in 1895-1896. While in New Bedford lately I found that bone was being held for a price of between four and five dollars a ton, and that oil was worth 30 cents a gallon. Bone has been taken 17 feet long. The bowhead has the longest and finest bone. The bowhead is so called on account of the arch in its head; a good sized bow-head will run from 65 to 75 feet in length. Mr. Milne informed me that the first sedentary whaling station is said to have been established in Cumberland Sound as far back as 1820 by Captain Penny, an English whaling captain. He afterwards commanded the "Lady Franklin" during one of the search expeditions in 1852.

Very little trade is done with the Esquimaux, as most of the skins they obtain are required for their dress, bedding, boats or tents. In the neighbourhood of the whaling stations the natives are fast ceasing to be expert in the use of their old-fashioned weapons, such as spears, small harpoons, bows and arrows, etc., as they are now pretty generally supplied with modern repeating arms, and there can be little doubt that those who have been brought up about the stations would be badly off were these closed and abandoned. The natives are highly spoken of by the captains of the whaling stations; they are honest, faithful and active in the hunt. At Black Lead we found two white

men who had married and settled among the Esquimaux, adopting altogether their manner of life. One of them, a very intelligent man whom I questioned on the subject, was dressed in skins and living in a skin teepee like a native. He informed me that he was fond of his wife and children, that the life agreed with him, that he was altogether free from the worries, cares and vicissitudes of our more artificial existence.

There is now no scurvy about the whaling stations, nor on board the whaling vessels wintering in the Welcome; they have learned to altogether avoid salt beef and pork and use the same food as the natives, that is seal, walrus and whale meat, occasionally varied with venison, bear meat, sea birds and fish. Some of the white men, who have been long with the natives and have travelled with them into the interior, have quite got over the repugnance for raw flesh.

New Bedford whaling vessels no longer winter at Marble Island. It was impossible to get fresh meat there as there were no natives about and no deer on the island. This forced the crews to use salt meats, with the result that they were always laid up with scurvy. The thing that most struck us, when calling at some of the old harbours where whalers had been in the habit of wintering, was the great number of graves; the death rate among the men, confined in the dark ill-ventilated cabins, in idleness and filth, with a diet of salted meats and often a too free use of alcohol, was something frightful. This is a thing of the past. Whalers now winter with the natives, employ them to hunt, and keep the ship supplied with fresh meat; the crews are kept actively at work in the open air, wearing the native clothing, so that there is an absolute freedom from scurvy. We could never get the natives to partake of salt meat; they seemed to have a horror of it.

COD

Are taken all the way up the Labrador coast. They usually strike in at Nachvak about the 10th of August and reach Cape Chudleigh from the 15th to the 20th of the same month, though their arrival depends somewhat on the condition of the ice along the Labrador shore. They strike at Port Burwell about a week after they are first taken off O'Brien Harbour, under Cape Chudleigh. They are not taken any further up Ungava Bay than Port Burwell. The agent of the Hudson's Bay post on St. George's River has frequently tried for cod off the mouth of George's River, but has never got any. We tried at several points in Hudson Bay between Churchill and the southern end of Mansfield Island with trawls, hand lines and jiggers, but got none. I was informed that a species of rock cod was occasionally taken in shoal water off the points of the reefs on the south-eastern shore of the bay. Captain Hawes informed me that he had often tried for bottom fish when becalmed in the bay, but he had never got anything; other Hudson Bay captains had met with the same experience. The whalers have repeatedly tried for bottom fish in the strait and northern part of the bay, but have never got any. Cod are reported by whalers and the natives to be found in Frobisher Bay and Cumberland Sound. Though we did not give the bay a fair trial, I am disposed to believe from reports of the Hudson Bay masters and the whalers that the true Atlantic cod do not exist in Hudson Bay.

At Port Burwell the cod back off about the 15th of September—they are taken off O'Brien Harbour for about two weeks longer; fishing vessels, however, do not care to remain north later than the 25th of September, as the weather is too rough and cold to risk the gear in the water. All cod fishing on the Labrador is done with traps, seines, or jiggers; the fish do not take the bait, though their stomachs are found filled with small squid, bill fish, and what the fishermen call blackberries.

HALIBUT.

Halibut are not taken to any extent on the Labrador; they have never been taken in the strait or bay; we failed to get any on our trawls. The natives informed me at Black Lead that they occasionally find small halibut frozen in the ice. Captain Spicer reports killing a seal that had brought to the surface a good-sized halibut. This was in the ice in the spring, 90 miles east of Resolution Island.

HERRING.

Herring are not taken north of Hamilton Inlet on the Labrador; they have never been seen in Hudson Bay.

SALMON.

Salmon are found in all the bays and large streams on the Labrador. An extensive salmon fishery is made by the Hudson's Bay Company's men at George's Whale, and Ungava or Koksoak rivers. The fishery is made in August; for a few years the company tried the experiment of shipping the salmon fresh to market in England, for this purpose their SS. "Diana" was fitted up with refrigerator chambers. The venture was not a success, and at present the fish are shipped salted or pickled. Salmon are found as far north as Lancaster Sound; those taken in the rivers before mentioned which empty into Ungava Bay, as well as those found in the bays and streams along the eastern shore of Baffin's Land, are exactly like the salmon taken in the Gulf of St. Lawrence and on the outer Labrador. As far as we know there are no streams of any considerable size emptying into Hudson Strait; we saw no salmon with the natives, though they told us that we would find trout in all the small streams, as we did.

The salmon fishing season was over before we reached Fort Churchill. From all I could gather, the salmon taken in the rivers emptying into the bay are small, not much larger than good sized trout. They winter in the rivers and lakes and only go out to the salt water with the breaking up of the ice in June, returning up stream in the end of July and August, at which time the fishery is carried on. These salmon are more like trout; their habits and movements are the same; they are undoubtedly what is known as Hearn's salmon. I do not believe that they ever leave Hudson Bay or pass in and out through the strait.

On the Labrador and rivers of Ungava Bay the salmon fishery is made with large sized gill-nets, set off from the shore, in which the fish mesh exactly after the fashion practised in the Gulf of St. Lawrence. In Baffin's Land no regular fishery is carried on; the fishing is done at intervals by the natives, who build stone weirs across the streams, into which the fish are driven. Large quantities of salmon and trout are often penned up in this way, the fish being generally speared or dipped out with bag-nets made of fine seal skin lines. At Churchill I found the Indian half-breeds fishing very much as did the Esquimaux in Baffin's Land, by building stone weirs across the streams, these walls converged to a narrow opening in the centre in which a twine bag-net with a square mouth was fitted; a couple of hands then came down the stream beating the water ahead of them. In this way the fish were driven into the bag-net.

TROUT.

Trout are found abundantly in all the streams of Labrador, and as far as I could gather from the natives and white men at Cumberland Sound, they are just as plenty in the rivers of Baffin's Land. The whalers while at Roe's Welcome, employ the natives to catch trout for them. As far as I could judge they are the ordinary sea trout of the Atlantic coast. A number of specimens were brought back, which have been submitted to the scientific experts of the department for report.

From Churchill River we brought back specimens of whitefish, suckers, pike and grayling. Attempts were made whenever it was possible to collect specimens by the use of dredges, tow-nets and seines. Such material as was collected has been handed over to the officers of your department. I append a list of these specimens which have been classified by Mr. Andrew Halkett.

From the above it will be seen that but little trading or fishing is now carried on by aliens about the shores of Hudson Bay or Baffin's Land. The only foreign vessels which enter Hudson Strait are the two or three small whaling vessels from New Bedford. There are two wintering north this season. The only trade done with the natives by these whalers is the purchase of a few skins of the polar bear, wolf, white and blue fox and musk ox. Not many musk ox skins are obtained in this way, as

these animals are not found about Whale Point or Repulse Bay, where the vessels winter. These skins are obtained in exchange for tobacco, rifles and ammunition, knives, files, needles, &c. The natives do not require food or clothing.

In Cumberland Sound there are no longer any whaling stations owned by aliens. The amount of supplies imported from Dundee to the establishments of the Messrs. Noble is small. Of course no duty is paid to Canada on these goods, nor on those used for trade by the United States whalers in Roe's Welcome. The amount of duty which might be collected on these goods is extremely small. The natives have very little to trade for, as they require most of the skins they obtain for their own use. The more valuable furs are not taken by the Esquimaux, as such furs are not found beyond the timber limit. Musk oxen are said to be found in northern Baffin's Land, and they are easily got at from the head of Chesterfield Inlet, but these parts are not visited by the United States whalers, and they get no skins from there.

From present appearances it is quite likely that the next two or three years will see the last of the whaling done by alien vessels in northern Hudson Bay. There is no likelihood of any sedentary stations being established in Roe's Welcome, as the locality is too far away and hard to get at. In Cumberland Sound the existing stations are owned by British subjects. Should the station at New Gummiute be reopened it is altogether likely that it will be under the ownership of the Messrs. Noble.

On closing this report I desire to acknowledge with extreme pleasure the active, intelligent and willing service rendered on all occasions by the officers and men of the "Diana." We had a most remarkable immunity from sickness or accident, and it is something to boast of that after such a voyage the ship was returned to her owners without having touched a rock or carried away a line. She, of course, lost a rudder, and got severely nipped in the ice now and then, but this was unavoidable, and the inspection made at St. John's by Lloyd's agent on her return showed that she was but slightly damaged after all. The officers and men of the Geological Survey, though not of the actual ship's company, were always ready to bear a hand, and in the representative for Manitoba and the North-west who made the voyage with us we all had a cheerful and interesting companion, and myself particularly a kind friend and adviser. I therefore beg to conclude the report of this exploratory voyage to Hudson Bay and Baffin's Land with the trust that I have carried out your instructions energetically and in a manner to meet with your approval.

The whole humbly submitted

By your obedient servant,

W. WAKEHAM,

Officer Commanding Expedition to Hudson Bay and Baffin's Land.

REPORT ON A COMPARISON OF THE METEOROLOGICAL OBSERVATIONS IN HUDSON STRAIT, 1884-85-86 AND 1897.

In 1885, between 22nd June and 5th July, the "Alert" was drifting about in the ice at the entrance to Hudson Strait, between longitude $64^{\circ} 25'$ and $66^{\circ} 25'$, not very far from Resolution Island. During this time the mean temperature as determined aboard by readings of the maximum and minimum thermometers, was 35.1° ; there was very little fog and the wind was generally light or moderate, although it on a few occasions blew strong. In 1897, during the corresponding period, the "Diana" was in the straits between 68° and 71° longitude, the mean temperature was 38.8° ; the wind never exceeded a fresh breeze and there was no fog to speak of except on 1st, 4th and 5th July. The latter half of June and early days of July were apparently several degrees warmer than in 1885.

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I. July we can make direct comparison between the weather experienced from the 9th to the 26th by the "Alert" in 1886, and the "Diana" in 1897, both vessels having spent most of this interval towards the western end of the strait. The mean temperature in 1886 was 39.4°, and in 1897, 42.7°; in the former year there was one gale, none in the latter, but in 1897 there was somewhat more fog than in 1886.

In August we have periods of 20 corresponding days (5th to 24th) in each of the three years 1884-85-97. The mean temperature of these periods were respectively 38.5°, 37.5° and 44.5°, which shows that August, 1897, was much warmer than the same month in either 1884 or 1885; in neither 1897 or 1885 were there any gales, but 1884 there were four heavy gales and much snow fell. Fog was infrequent in all three years.

The only direct temperature comparison we can make in September is from the 7th to 20th, in the years 1886 and 1897, which periods give respectively means of 36.6° and 37.9°, indicating that, like the preceding months, 1897 was warmer than 1886, and probably than either 1885 or 1884. In 1884 September was not stormy, only one moderate gale having occurred, but in both 1885 and 1886 there were many very heavy gales and the weather was very much worse than in 1897, when apparently but one heavy blow occurred while the ship was in the strait between the 7th and 20th.

In October, in order to have a comparison, we must compare the observations made on the "Diana" between the 14th and the end of the month, with those made ashore between the same dates in 1884 and 1885. The mean temperatures thus obtained for 1884, 1885 and 1897 were respectively 14.4°, 22.1° and 28.4°, which show that at least the last half of October, in this past year, might almost be considered balmy compared with 1884. In 1884 the temperature fell to zero on 24th, 25th and 26th October, and to -2° on the 31st, whereas in 1897 17° was the lowest temperature recorded.

R. F. STUPART,

Director.

WEEKLY ABSTRACT of Meteorological Observations taken on board Dominion steamer
"Diana," June to October, 1897.

| Weeks Ending. | BAROMETER. | | | | TEMPERATURE. | | | | Hours Rain. | Hours Snow. | Days Fog. | Days of Wind more than "fresh." |
|---------------|------------|----------|---------|---------|--------------|------|------|--------|-------------|-------------|-----------|---------------------------------|
| | Mean. | Highest. | Lowest. | Range. | Mean. | Max. | Min. | Range. | | | | |
| | Inches. | Inches. | Inches. | Inches. | ° | ° | ° | ° | | | | |
| June 12 | 30.22 | 30.33 | 30.00 | 0.33 | 34.4 | 73 | 28 | 45 | 0 | 2 | 34 | 0 |
| do 19 | 29.79 | 30.16 | 29.42 | 0.74 | 32.5 | 45 | 24 | 21 | 52 | 10 | 4 | 0 |
| do 26 | 30.10 | 30.25 | 29.82 | 0.43 | 35.3 | 58 | 24 | 34 | 18 | 0 | 1 | 0 |
| July 3 | 29.87 | 30.08 | 29.59 | 0.49 | 37.3 | 54 | 29 | 25 | 0 | 0 | 0 | 0 |
| do 10 | 29.4 | 29.63 | 28.32 | 0.81 | 35.4 | 44 | 28 | 16 | 62 | 2 | 2 | 0 |
| do 17 | 29.72 | 30.16 | 29.38 | 0.78 | 40.6 | 51 | 30 | 21 | 8 | 0 | 0 | 0 |
| do 24 | 29.98 | 30.30 | 29.53 | 0.77 | 44.6 | 64 | 31 | 33 | 10 | 0 | 2 | 0 |
| do 31 | 29.97 | 30.37 | 29.69 | 0.68 | 46.7 | 62 | 34 | 28 | 0 | 0 | 0 | 0 |
| Aug. 7 | 29.83 | 29.98 | 29.61 | 0.37 | 55.6 | 79 | 32 | 47 | 24 | 0 | 1 | 0 |
| do 14 | 29.87 | 30.11 | 29.52 | 0.59 | 44.0 | 56 | 35 | 21 | 29 | 0 | 3 | 0 |
| do 21 | 29.68 | 29.91 | 29.45 | 0.46 | 42.1 | 54 | 35 | 19 | 40 | 0 | 2 | 0 |
| do 28 | 29.69 | 29.81 | 29.51 | 0.30 | 44.0 | 50 | 34 | 16 | 14 | 0 | 2 | 0 |
| Sept. 4 | 29.88 | 30.21 | 29.51 | 0.70 | 46.2 | 53 | 38 | 15 | 35 | 0 | 2 | 1 |
| do 11 | 29.83 | 30.18 | 28.94 | 1.24 | 37.1 | 43 | 29 | 14 | 5 | 10 | 3 | 1 |
| do 18 | 29.85 | 30.15 | 29.60 | 0.55 | 40.5 | 53 | 27 | 26 | 2 | 6 | 1 | 0 |
| do 25 | 29.98 | 30.17 | 29.71 | 0.46 | 40.9 | 58 | 27 | 31 | 0 | 9 | 0 | 0 |
| Oct. 9 | 29.96 | 30.17 | 29.31 | 0.86 | 45.9 | 67 | 31 | 36 | 17 | 0 | 2 | 0 |
| do 16 | 29.72 | 30.32 | 28.90 | 1.42 | 35.9 | 44 | 27 | 17 | 27 | 6 | 3 | 1 |
| do 23 | 29.76 | 30.17 | 29.28 | 0.89 | 27.9 | 37 | 18 | 19 | 0 | 25 | 0 | 0 |
| do 30 | 29.45 | 30.02 | 28.99 | 1.03 | 28.6 | 37 | 21 | 16 | 0 | 28 | 0 | 0 |
| Nov. 6 | 29.88 | 30.35 | 29.24 | 1.11 | 30.4 | 40 | 17 | 23 | 9 | 23 | 0 | 2 |

LIST OF ZÖOLOGICAL SPECIMENS, ETC., COLLECTED BY DR. WAKEHAM
AND MR. LOW AT VARIOUS POINTS IN HUDSON BAY AND STRAIT
DURING SEASON OF 1897.

Dredged between King George Sound and bottom of Ungava Bay, summer, 1897 :

FISHES.

1. Sculpins. *Cottoids*.
2. Vahl's Lycodes. *Lycodes vahlitii*, Reinhardt.
3. Pollack or coal-fish. *Gadus (pollachius) virens*, L.
4. Alligator-fish. *Aspidophoroides monopterygius*, Bloch.
5. Sea-snails. *Liparis*.

GASTEROPODS.

6. Whelks. *Buccinum plectrum*, Stimpson, and *B. ...* Gray.
7. *Neptunea*.
8. Pelican's Foot. *Aporrhais occidentalis*, Beck.
9. Screw-shells. *Turritella*.
10. Periwinkles. *Littorina palliata*, Say.
11. Periwinkles. *Littorina rudis*, Maton.
12. *Natica clausa*. Broderip and Sowerby, with *Eschara elegantula*, d'Orbigny, attached.
13. *Margarita cinerea*, Couthuoy.
14. *Cyclostrema*.
15. Limpets. *Acmæa*.
16. Chitons. *Tonicella marmorea*, Fabricius.
17. *Bulla*.
18. Egg-case of *Fusus*.

PTEROPODS.

19. *Clio*. (A few specimens).

LAMELLIBRANCHS.

20. *Saxicava rugosa*, Lamarck.
21. Clams. *Mya arenaria*, L.
22. *Macoma*.
23. *Astarte banksii*, Leach.
- 23½. *Serripes grænlandicus*, Gmelin.
24. Cockles. *Cardium islandicum*, L.
25. *Leda minuta*, Müller.
26. *Crenella*.
27. Mussel. *Mytilus edulis*, L. (Valve with *Balanus* attached.)

BRACHIOPOD.

28. Lamp-shell. *Rhynchonella psittacea*, Gmelin. (Barnacles attached.)

ECHINODERMS.

29. Sea-urchin. *Strongylocentrotus drobachiensis*, A. Ag.
30. Star-fish. *Asterias*.

CŒLEENTERATES.

31. Actinozoans.

Bay, summer, 1897 :

y.

antula, d'Orbigny,

ned.)

HUDSON BAY EXPEDITION OF 1897.

81

CRUSTACEANS.

32. Crabs. *Hyas*.
33. Hermit-crabs. *Pagurus*.
34. Prawn. *Pandalus*.
35. Sand Shrimp. *Gammarus*, and an allied form.
36. *Phronima*.
37. Barnacles. *Balanus*.

ANNELIDS.

38. *Polynoe*.
39. *Nereis pelagica*, L. (Male and female.)
40. Tubes of *Cistenides*.
41. Tube of *Serpula*.
42. Tubes of *Spirorbis*. On algae.
43. *Euchone elegans*.

44. POLYZOA.

45. SPONGIADÆ.

46. ALGÆ.

Dredged in 30 fathoms of water, 20 miles off Churchill, clay bottom, small stones and gravel, 2nd September, 1897 :

LAMELLIBRANCHS.

47. *Yoldia*.
48. *Modiolaria*.
49. *Saxicava rugosa*, Lamarck.

50. OPHIURIANS.

CRUSTACEANS.

51. Isopod.
52. Baffin's Bay Arcturus. *Arcturus baffinii*, Sabine.
53. Mantis shrimp. *Caprella*.
54. Sand shrimp. *Gammarus*.
55. Shrimp. *Crangon*.

POLYZOANS.

56. *Myriozeugum subgracile* (Fragments).
57. *Cellepora* (Fragment).

Obtained south of North Foreland, about 30 miles off shore, on night of 21st August, 1897 :

58. *Phronima*, and a smaller Crustacean.

Taken in seine, Sir Terence O'Brien Harbour, Cape Chudleigh, 28th July, 1897 :

59. Sculpins. (*Cottoids*.)
60. Portions of some Teleostean.
61. Crustaceans. *Gammarus*, and an allied form.

Obtained at Nachvak Bay, Labrador, 3rd August, 1897 :

62. Presumably Smolts. (*Salmo salar*, L.)

Obtained by the trawl, King George Sound, in 40 fathoms of water, 9th September, 1897, south side, Hudson Strait.

- 63. Holothurians. *Pentacta frondosa*, Jæger.
- 64. Holothurians. *Psolus phantapus*, L.
- 65. Shell of Barnacle. *Balanus*.
- 66. Ascidians, with Annelids, Mollusc Valves, etc., attached.

Dredged in King George Sound, in 40 fathoms of water, south side of Hudson Strait, 9th September, 1897:

- 67. *Natica*.
- 68. *Astarte banksii*, Leach.
- 69. *Saxicava rugosa*, Lamarck. (Valve.)
- 70. *Pecten islandicus*, L. (Valve.)
- 71. Ascidian.
- 72. Fragments of *Balanus*, of *Strongylocentrotus drobachensis*, A. Ag., of *Cellepora*, Alge, &c.

Found in pools at low water, Kekerton, Cumberland Sound, 17th August, 1897:

- 73. Nudibranch. *Eolis*.
- 74. *Polyzoa* (Fragments).
- 75. *Annelid*.

Obtained in shoal water a short distance off the mouth of Churchill River, in about 20 fathoms of water, summer 1897:

- 76. Salve Bug. *Æga psora*, Krøyer.

Found on the surface of the ice in Hudson Strait early in July:—

- 77. *Diatoms*. (See note, p. 83).

Besides the above mentioned a few gastropods, bivalves, molluscs and fragments of annelids, crustaceans, alge, etc., require additional determination.

LARGER SPECIMENS.

Obtained on the south shore of Hudson Strait from July to September, 1897:—

- 5 Sculpins. (*Cottoids*.)

Obtained at Nachvak, in the mouths of small rivers emptying into the bay on the 3rd August, 1897.

- 2 Sea-trout. *Salvelinus fontinalis immaculatus*, H. R. Storer.

Fishes obtained at Churchill on 1st of September:—

- 2 Suckers. *Moxostoma*. In the river.
- 6 Whitefish. *Coregonus labradoricus*, Richardson. In the sea.
- 3 Grayling. *Thymallus signifer*, Richardson. In the Churchill River and its branches.
- 1 Pike. *Esox lucius*, L. In the river.

oms of water, 9th Sep-

outh side of Hudson

A. Ag., of *Cellepora*,

th August, 1897 :

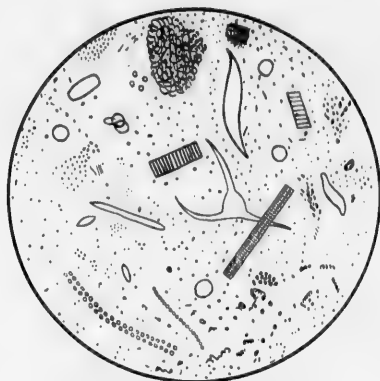
Churchill River, in

and fragments of

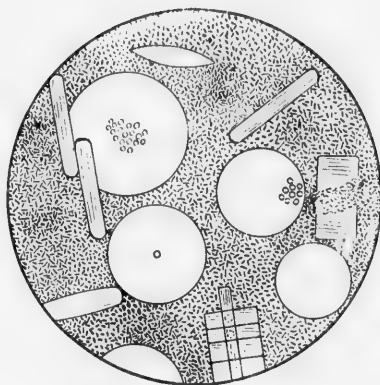
mber, 1897 :—

into the bay on

River and its



MAGNIFIED 50 DIAMETERS.



MAGNIFIED 500 DIAMETERS.

Diatoms and allied forms found on the surface of the ice in Hudson Strait early in July, 1897.

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Invertebrates obtained along the south shore of Hudson Strait, at various dates between 16th July and 1st of September, 1897:—

- 5 Crabs. *Hyas araneus*, L.
- 1 Pecten, and a Pecten valve. *Pecten islandicus*, L.
- 5 Star-fishes. *Solaster papposus*, L.
- 2 Sea Urchins. *Strongylocentrotus drobachiensis*, A. Ag.
- Sea Cucumbers.
- Psolus phantapus*, L.
- Pentacta frondosa*, Jæg.
- Ascidians.
- Ascidia*.
- Boltenia*.

ANDREW HALKETT.

Diatoms found on the surface of the ice in Hudson Strait early in July, 1897. The species remain to be determined, and the following extracts may in this connection be of interest.

From Nansen's "Farthest North":—

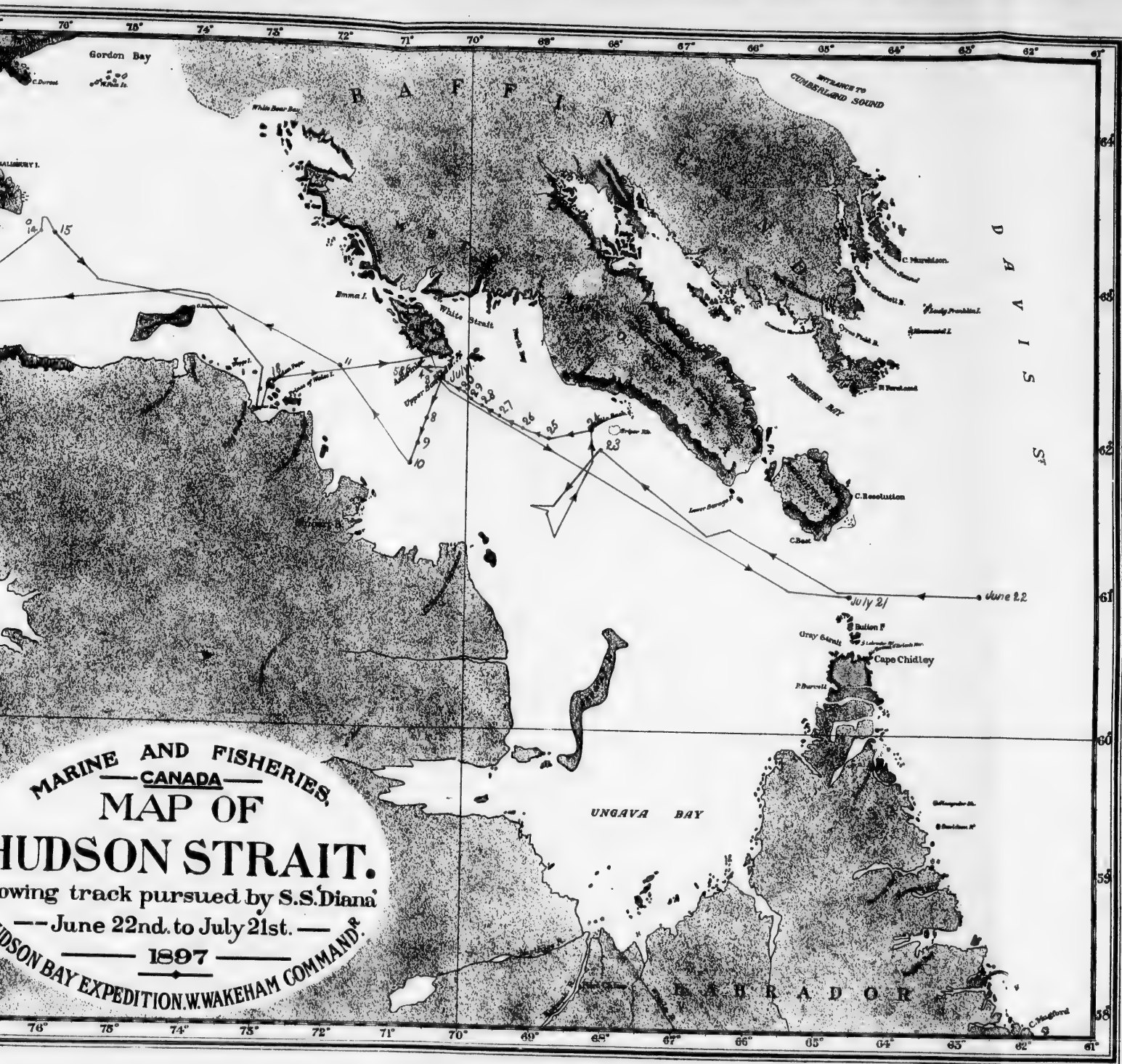
"In the afternoon I examined the melted water of the newly formed brownish-red ice, of which there is a good deal in the openings round us here. The microscope proved this colour to be produced by swarms of small organisms, chiefly plants, quantities of diatoms and some algae, a few of them very peculiar in form." I., p. 173.

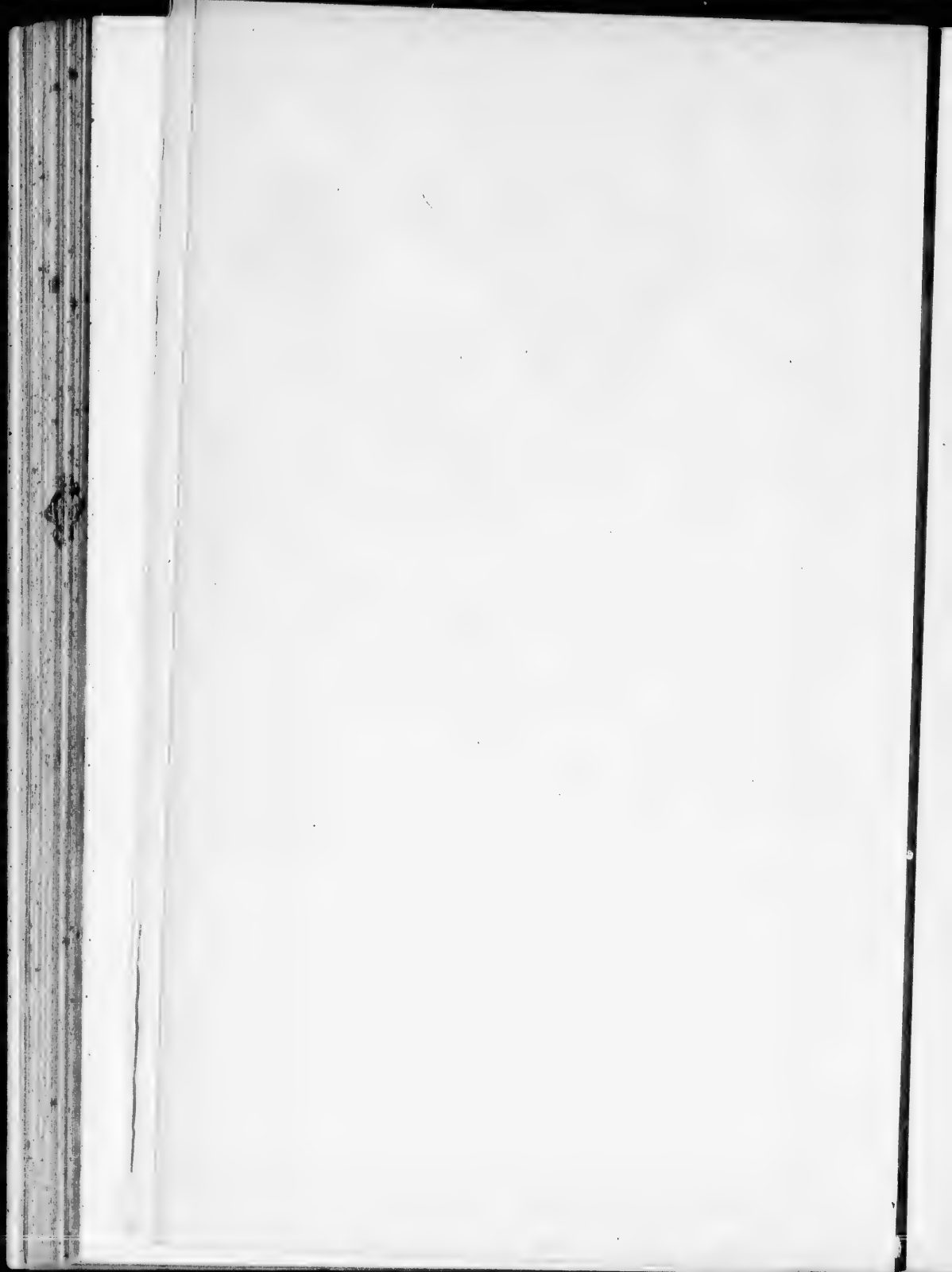
"The upper surface of the flocs is nearly everywhere of a dirty brown colour, at least, this sort of ice preponderates, while pure white flocs, without any traces of a dirty brown on their surface, are rare. I imagined this brown colour must be due to the organisms I found in the newly-frozen, brownish-red ice last autumn (October); but the specimens I took to-day consist for the most part of mineral dust mingled with diatoms and other ingredients of organic origin." I., pp. 301, 302.

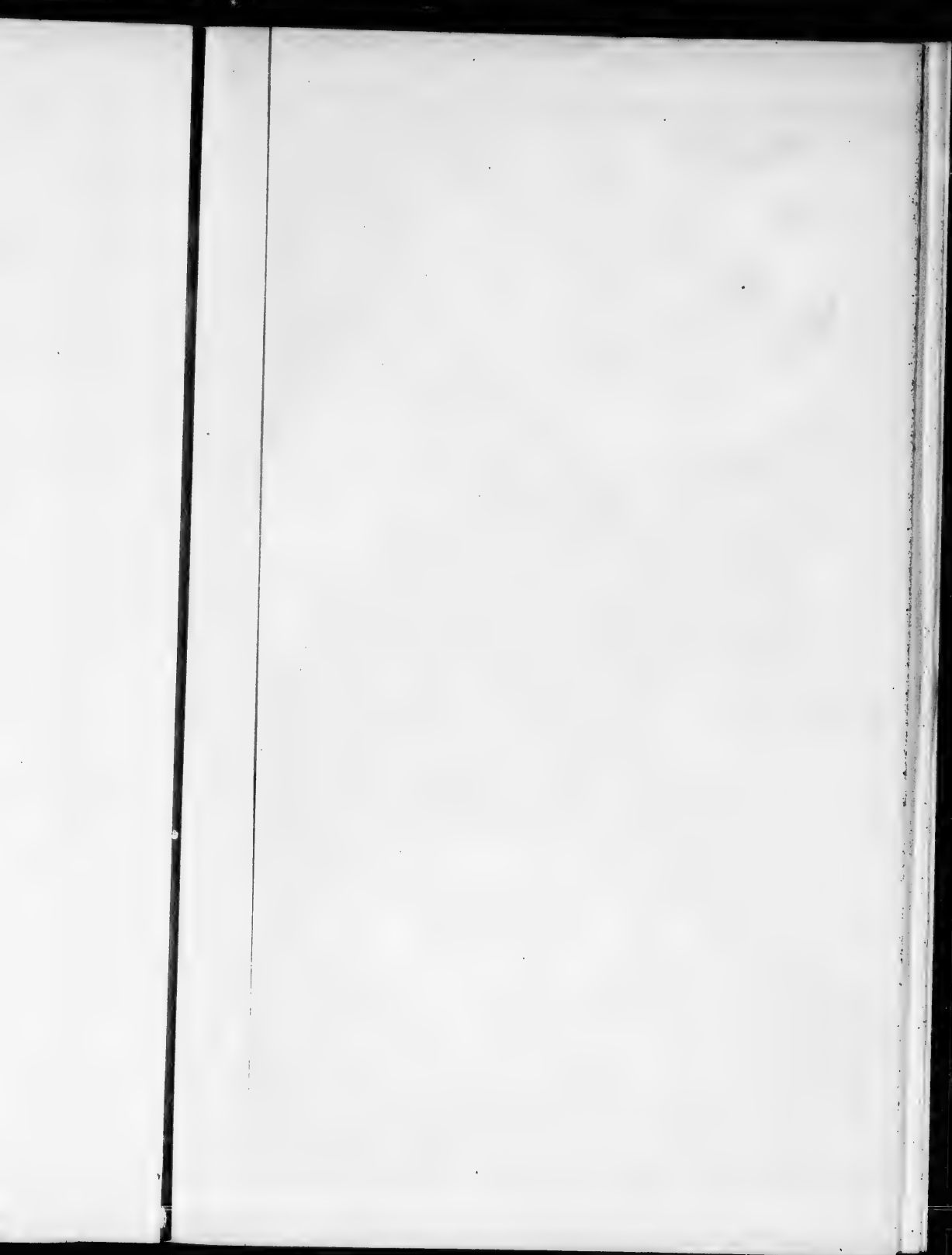
"Professor Cleve, of Upsala, * * * says: 'These diatoms are decidedly marine (i. e., take their origin from salt water), with some few fresh-water forms which the wind has carried from land. The diatomous flora in this dust is quite peculiar and unlike what I have found in many thousands of other specimens, with one exception with which it shows the most complete conformity, namely, a specimen which was collected by Kellman during the 'Vega' expedition on an ice-floe off Cape Wankarem, near Bering Strait. Species and varieties were perfectly identical in both specimens.' Cleve was able to distinguish sixteen species of diatoms. All these appear also in the dust from Cape Wankarem, and twelve of them have been found at that place alone, and nowhere else in all the world. This was a notable coincidence between two such remote points, and Cleve is certainly right in saying: 'It is indeed, quite remarkable that the diatomous flora on the ice-floes off Bering Strait and on the east coast of Greenland should so completely resemble each other, and should be so utterly unlike all others: it points to an open connection between the seas east of Greenland and north of Asia.' 'Through this open connection drift ice is, therefore, yearly transported across the unknown Polar Sea.'" I., p. 29.

26











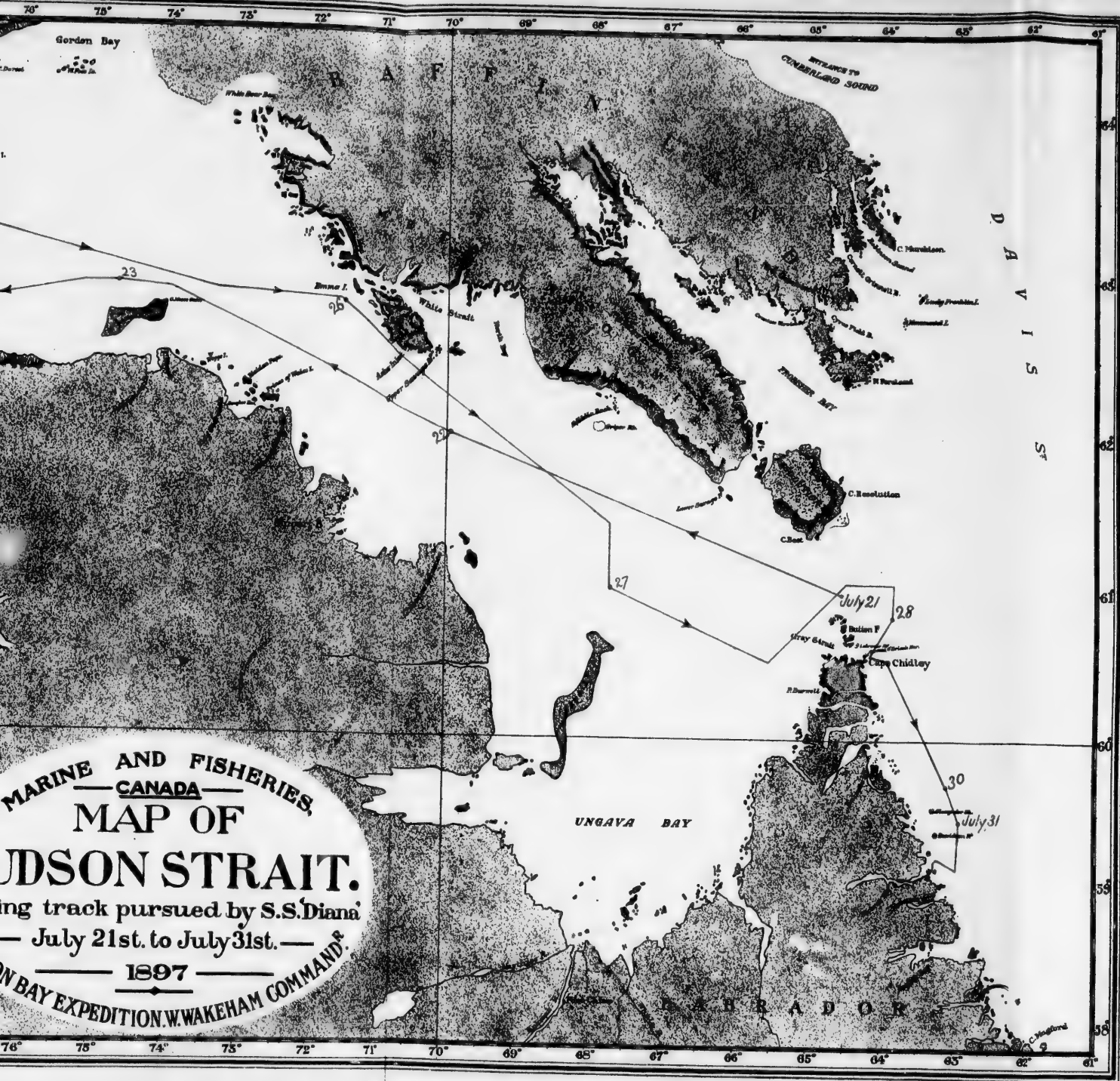
MARINE AND FISHERIES,
— CANADA —
MAP OF
HUDSON STRAIT.

— track pursued by S.S. Diana —

— July 21st. to July 31st. —

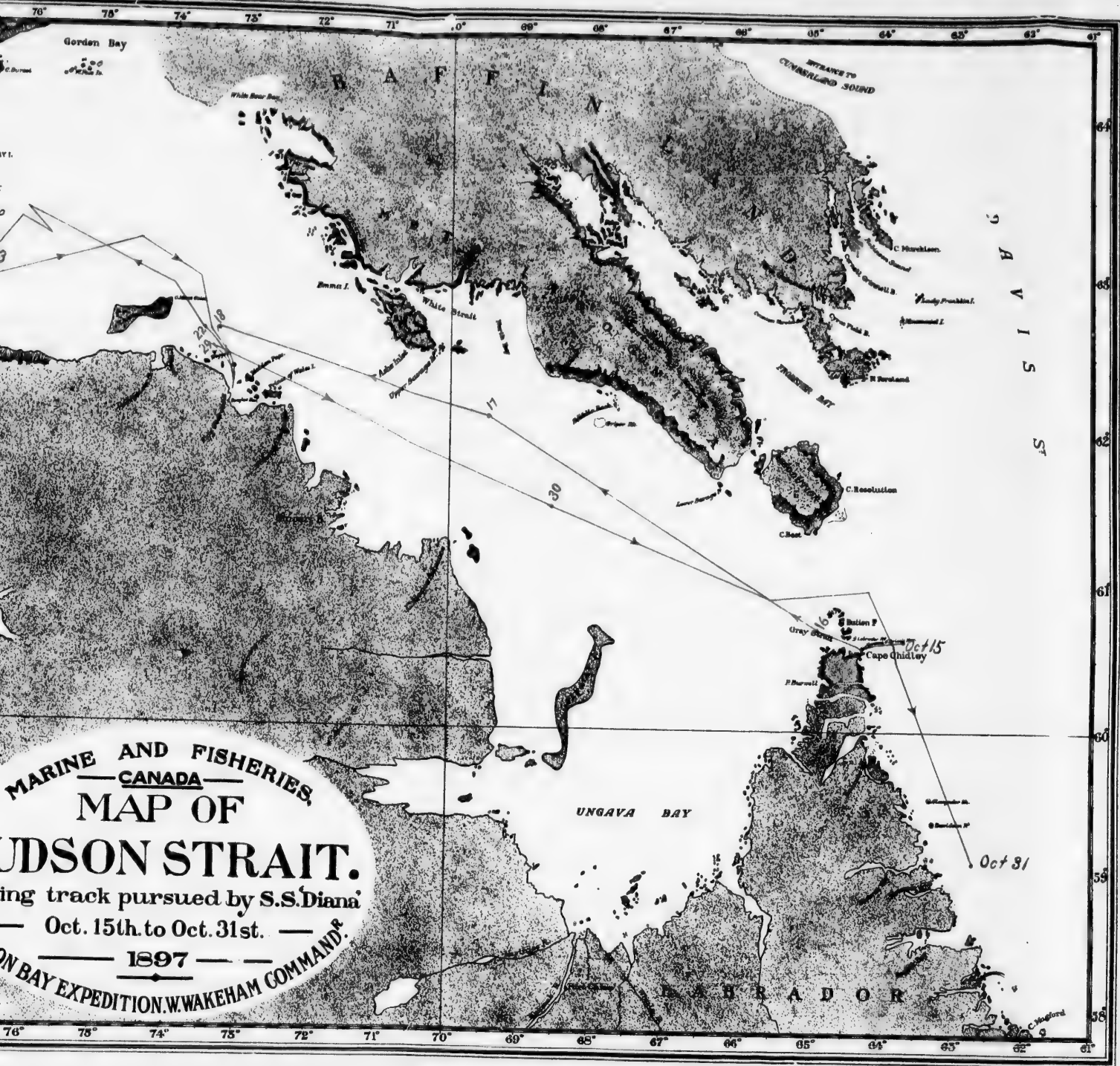
— 1897 —

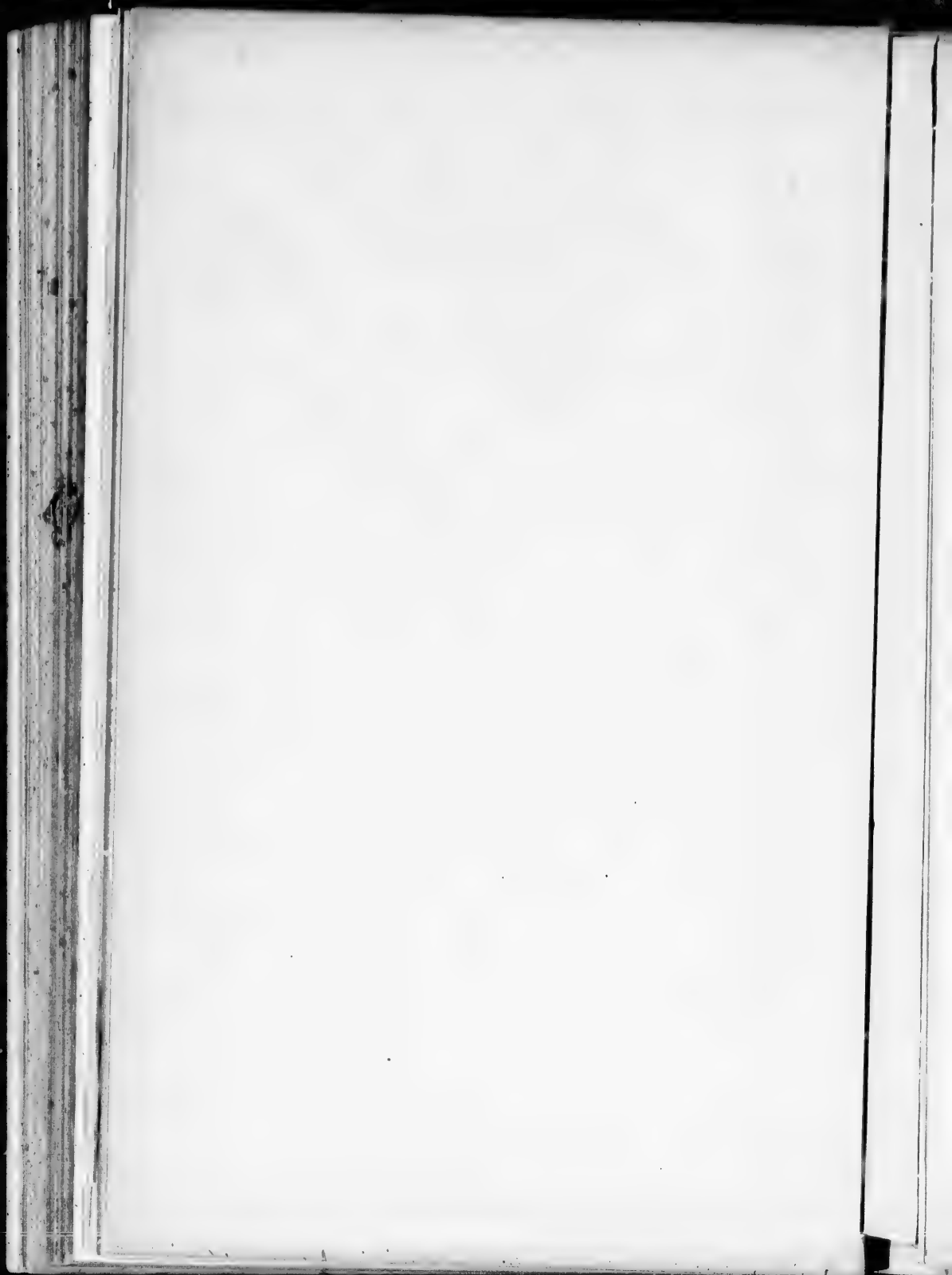
— BAY EXPEDITION. W. WAKEHAM COMMANDER. —

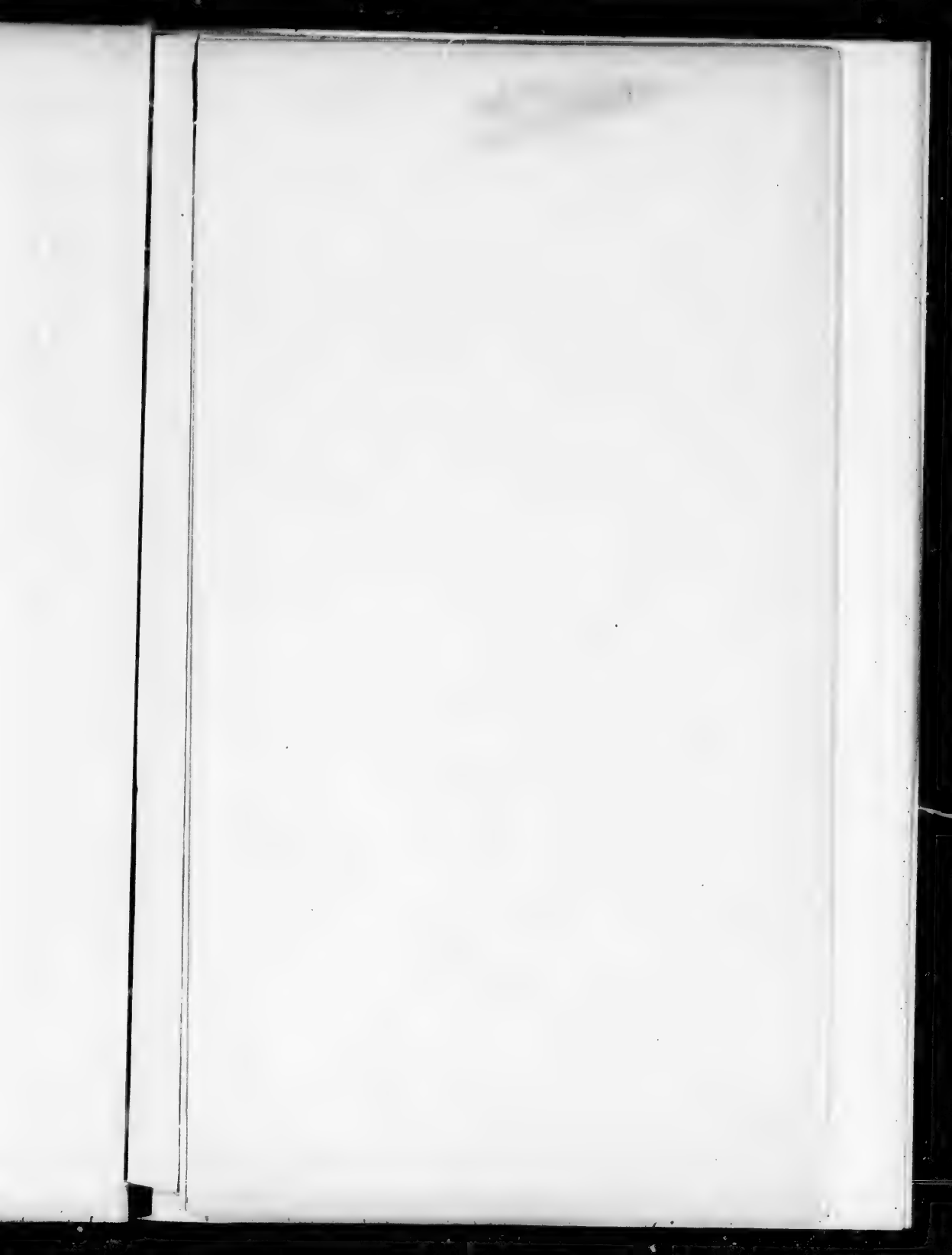


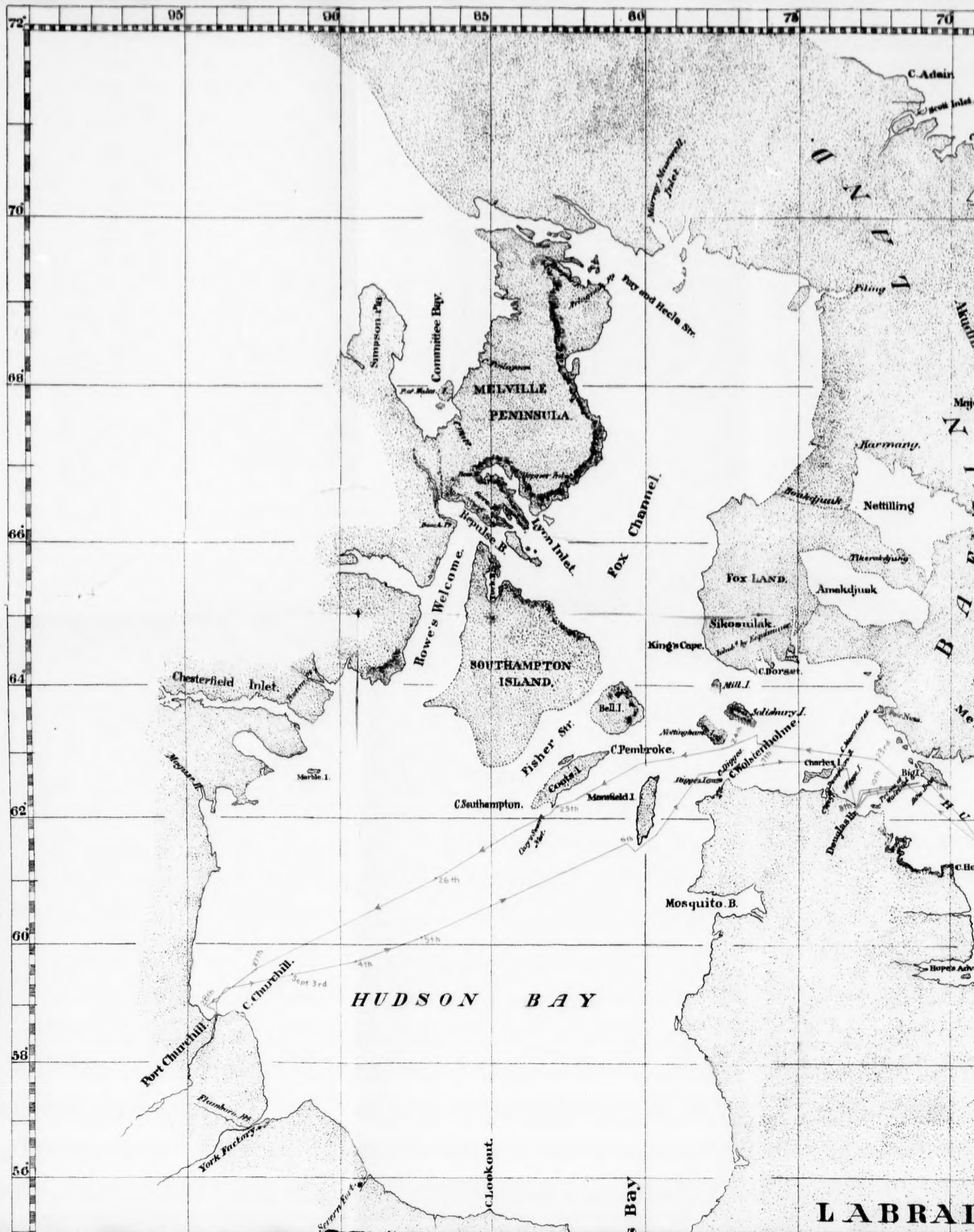


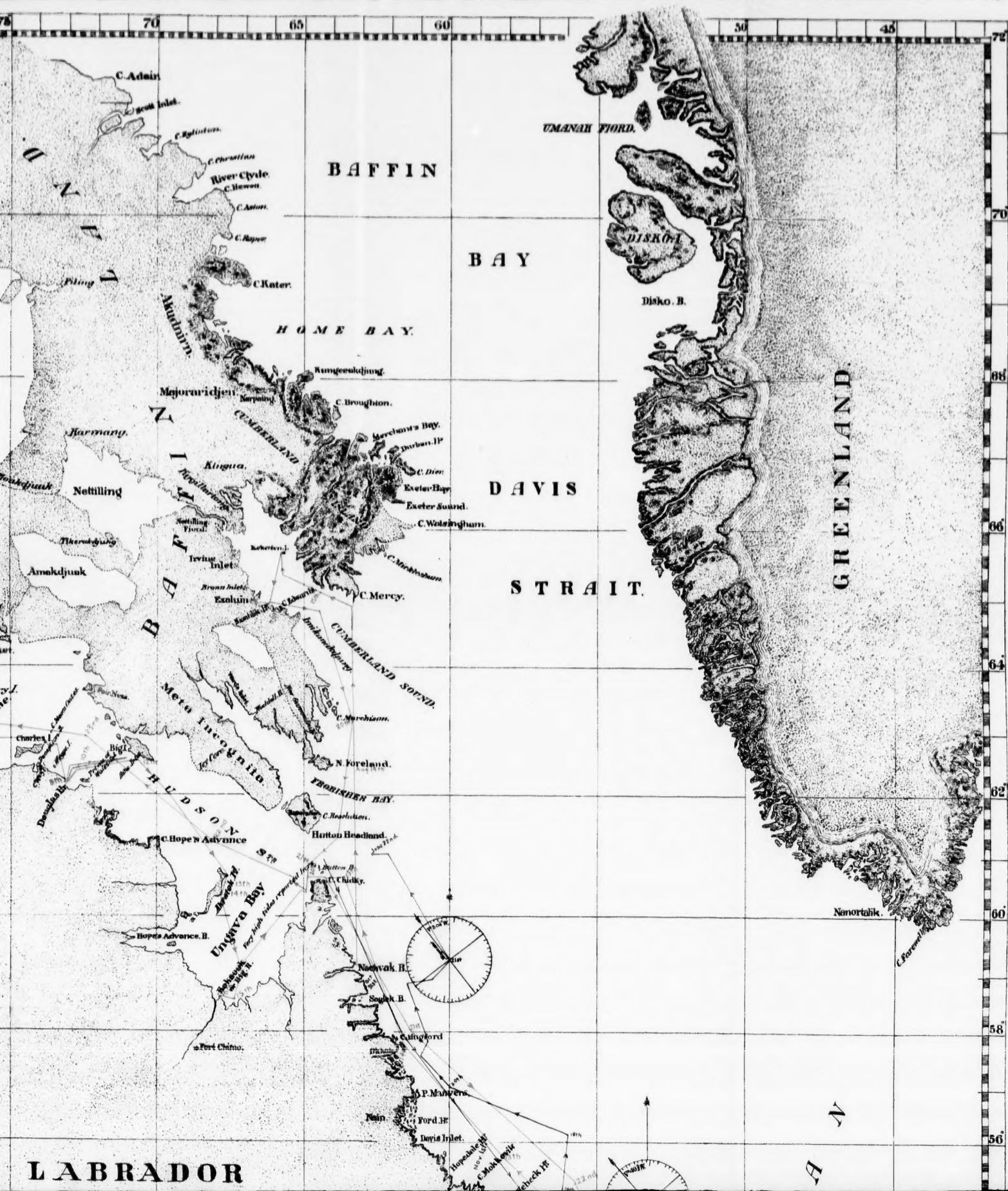












MAP OF HUDSON BAY AND STRAIT

showing the track pursued by S.S. "Diana"

— during the season of —

1897

in command of D^r Wakeham

Dept of Marine and Fisheries.

— CANADA. —

NOTE:— The tracks shown in green are those from Halifax to the mouth of the Strait, and the final return in the fall.

The red track shows the trip from Nachvak to Cumberland Sound; thence through the Strait and across the Bay to Churchill; thence by way of Ungava Bay to St. Johns N.P., and the return to the mouth of the Strait.

The first second and last trips through the Strait are shown on separate maps.

Drawn by G.L. Bourchier, C.E. Ottawa, Ont.

